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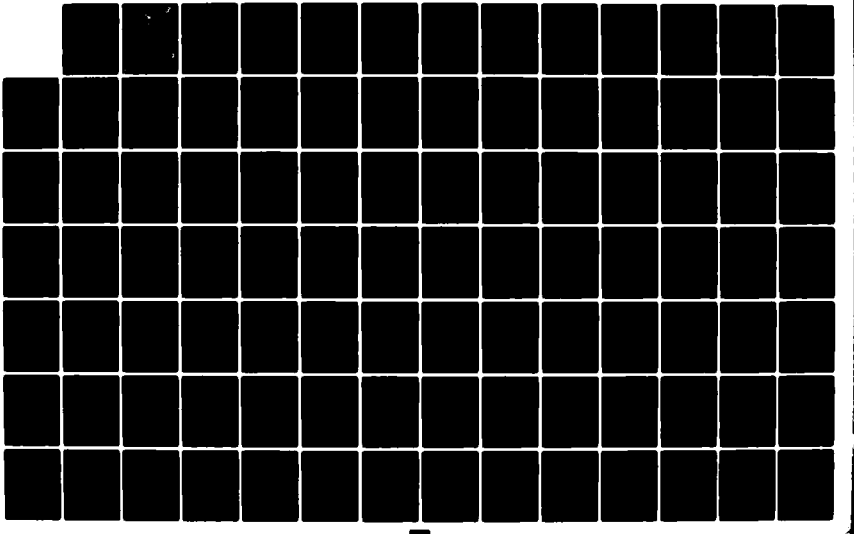

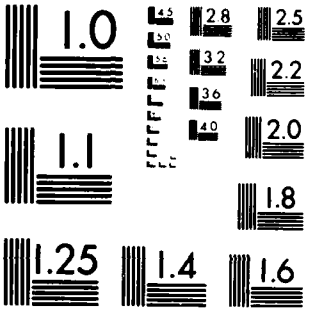

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY (ATC)

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

A MEASUREMENT OF AFIT CONTRACTING AND ACQUISITION MANAGEMENT PROGRAM USEFULNESS AS PERCEIVED BY GRADUATES AND THEIR SUPERVISORS

Robert B. Gillette, Captain, USAF
John H. Wayne Jr., Captain, USAF

LSSR 49-82

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This research measured the usefulness of the AFIT School of Systems and Logistics Contracting and Acquisition Management (CAM) graduate education program. Graduates and supervisors in the contracting/manufacturing career field provided feedback on the usefulness of an AFIT CAM education in postgraduate assignments. The target population was active duty Air Force military/civilian graduates of the AFIT CAM program and their immediate supervisors. Surveys were mailed to 105 AFIT CAM graduates, classes 1974B through 1981, and 78 supervisors. Survey response rates for graduates and supervisors were 73.3 percent and 52.6 percent, respectively. Questionnaires consisted of three parts: Demographics, Perceptions, and Open-Ended Questions. A demographic profile of AFIT CAM graduate respondents was presented in a series of nineteen numerical tables. Graduate/supervisor perceptions of AFIT CAM program usefulness were analyzed by means of nonparametric statistical tests and curriculum rankings. Responses to Open-Ended Questions revealed potential curriculum topics necessitating increased/decreased emphasis in future AFIT CAM course offerings. Research results indicated that the AFIT CAM program: 1) is indeed useful in postgraduate contracting/manufacturing assignments; 2) has been effectively managed since its inception; and 3) has maintained topical currency with user requirements in the field.

LSSR 49-82

A MEASUREMENT OF AFIT CONTRACTING AND ACQUISITION MANAGEMENT PROGRAM USEFULNESS AS PERCEIVED BY GRADUATES AND THEIR SUPERVISORS

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

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Captain, USAF

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September 1982

This thesis, written by

Captain Robert B. Gillette

and

Captain John H. Wayne Jr.

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT

DATE: 29 September 1982

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CHAPTER 1

THE RESEARCH PROBLEM

Introduction

There is a critical need for highly educated, competent and professional contract managers who can operate effectively in today's complex acquisition environment (42: 5, 7). Mr. Donald E. Sowle, Administrator for Federal Procurement Policy, Office of Management and Budget, noted:

> As the procurement budget grows and procurements become more complex, we need to ensure that the work force keeps pace both in quality and quantity. Procurement systems cannot work effectively unless they are staffed by dedicated professionals who can exercise proper initiative and judgment in making complex and vital procurement decisions with the private sector [42:5].

This need is even more important, given the contemporary contracting environment involving: 1) dramatic increases in Federal budget funding for national defense; 2) implementation of recent Department of Defense (DoD) initiatives to induce efficiency and stability in the acquisition process for major weapon systems; and 3) Congressional and DoD concern over strategies to revitalize an aging and shrinking defense industrial base (8:54-75; 30:7-13; 48:5.9-5.20).

Major General Joseph H. Connolly, USAF, Director of Contracting and Manufacturing Policy (HQ USAF/RDC), noted the challenge this environment poses to the contracting community,

stating:

> The decade of the eighties will mandate that the Air Force contracting people develop new and improved strategies for acquiring the weapon systems and other supplies and services required to strengthen our Nation's defense capabilities. We will find ourselves in a marketplace that is constantly fluctuating as national and international events unfold [11:2].

Public concern over prudent and judicious use of available tax dollars also dictates a need for competent, knowledgeable contract managers. Dr. Joseph L. Hood, Assistant Director for Training, Federal Acquisition Institute, stated:

> The public is concerned about the integrity of the processes through which the Federal procurement expenditure is made. The critical component in the processes concerns the competency of the application of the knowledge and skills possessed by personnel working in the procurement offices [22:8].

Statements by elected Government officials reflect public concern for competence as well. In his opening remarks prior to a FY83 budget hearing, the Senate Armed Services Committee Chairman, Senator John Tower, noted, "There must be greater emphasis placed on the accountability of this [Reagan] administration, as well as the Congress, for the efficient execution of defense resources [28:48]."

If contract managers are to fulfill the needs of the contracting environment and satisfy public concern for competence, a broad-based education in business and management is required (37:7, 18). The reason stems from the many requirements placed upon the contract manager. Knowledge of the Defense Acquisition Regulation (DAR), for example, is not enough. Contract managers cannot function merely as clerks

safely following procedures. Contract managers must: 1) possess the knowledge of product trends and business methods used by industries with which they interact; 2) be flexible, capable of recognizing situations where strict application of policy and procedures would not benefit the Government and seek authority to deviate; 3) be a working partner among other technical experts (engineers, price analysts, data managers, auditors, and inspectors) with the right to question and influence requirements both in terms of quantity and quality; and 4) be able to exercise sound judgment in evaluating potential contractor experience, facilities, organization, reputation, financial resources, and other factors (6:36). In short, the contract manager must be oriented to the political, economic, and business environment in which he or she must operate. A model depicting some of the demands that this environment places upon contract managers can be seen in Fig 1.1 (50:95). To partially satisfy the educational requirements of contract managers functioning in this environment within the Air Force, the Air Force Institute of Technology (AFIT) School of Systems and Logistics provides what is now known as the Contracting and Acquisition Management (CAM) graduate education program.

Background

The predecessor to the current CAM graduate education program was created in 1973, following recommendations of the Commission on Government Procurement highlighting the need for improvement in Government-wide procurement education (39:128).

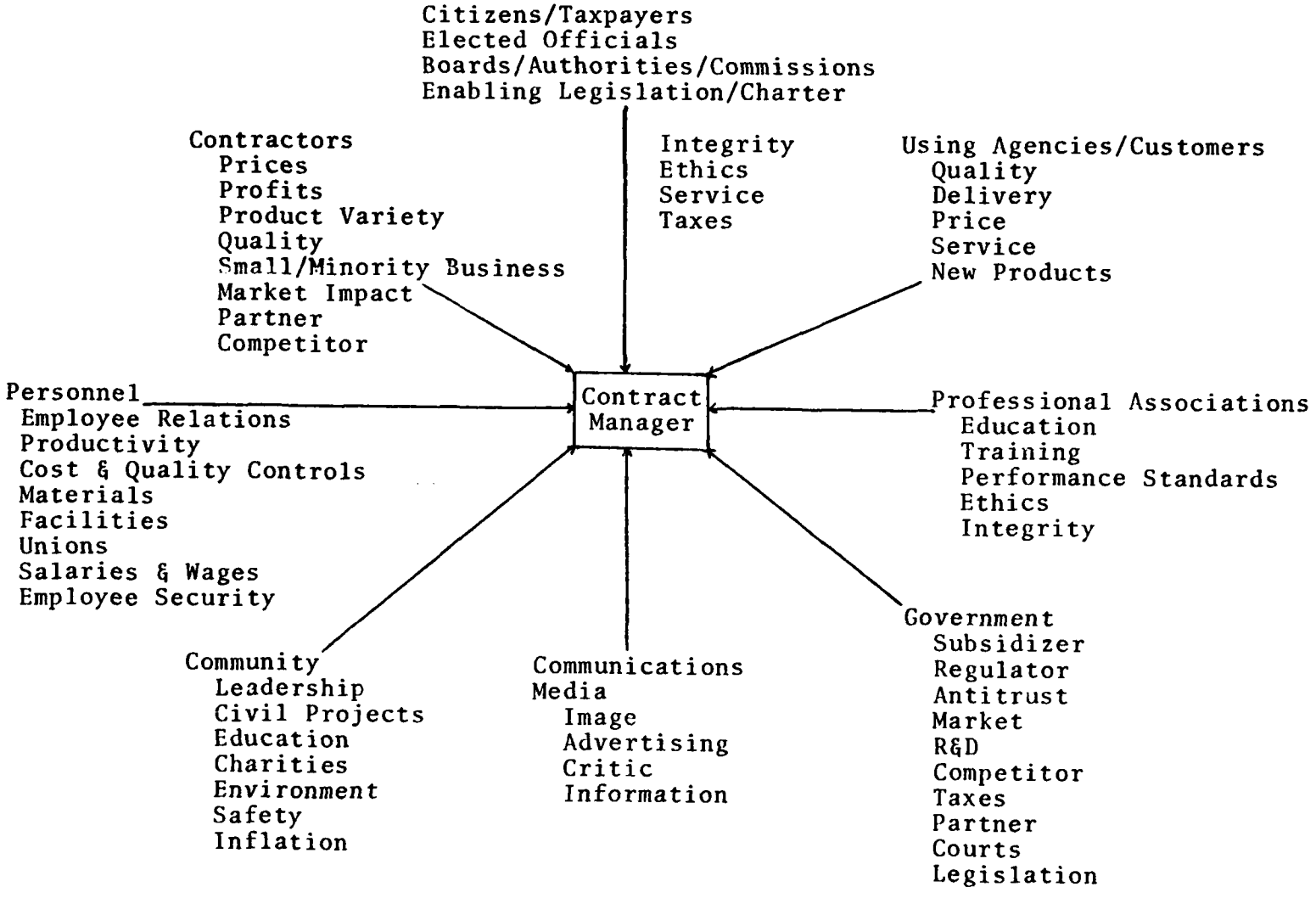

Fig 1.1. Demand on Contract Managers

The sponsor of the new Procurement Program was Brigadier General Robert F. Trimble, then USAF Director of Procurement Policy under the Deputy Chief of Staff for Systems and Logistics (31). The Procurement Program was located in the Management Sciences Department of the Graduate Education Division within the AFIT School of Systems and Logistics at Wright-Patterson AFB, Ohio (31). Major Martin D. Martin headed the program as Procurement Major Program Coordinator (31). A Master of Science degree in Logistics Management with a Procurement Major was offered. In 1974 the first graduates from the Procurement Program entered the field.

In 1978 a concept study initiated by AFIT Commandant Major General Gerald E. Cooke recommended reorganizing AFIT residence schools along more functional lines (5:86-87). For the School of Systems and Logistics, the study recommended elimination of the existing Graduate Education and Continuing Education Divisions and, in their place, creation of five academic departments: Contracting Management, Logistics Management, Systems Acquisition Management, Organizational Sciences, and Communication and Humanities. This recommendation was implemented in 1979. Along with the creation of the Department of Contracting Management, the title of the Procurement graduate education program changed to the Contracting and Acquisition Management (CAM) option (3:A-30). The degree offered was a Master of Science in Logistics Management with Contracting and Acquisition Management major. The option name was recently changed to Contracting and Manufacturing

Management to correspond with the sponsor's title change, Director of Contracting and Manufacturing Policy (HQ USAF/RDC). To date, approximately 150 military and civilian contract managers have graduated from the program (9).

Purpose of the Research

A critical element of any educational program is the measurement of its usefulness (50:96). The basis of this research was to measure the usefulness of the AFIT CAM program. One measure of program usefulness was based on the utility of the AFIT CAM curriculum as perceived by its graduates and their supervisors. The outcome of this research was the development of a feedback system based on perceptions from the field. This system may be viewed as a model of AFIT CAM program educational usefulness (see Figure 1.2).

In Figure 1.2, inputs to the AFIT CAM program originated from a broad spectrum of Air Force Commands as well as other services and Federal agencies. Through the educational process (i.e., the AFIT CAM curriculum), these inputs were transformed into outputs (contract managers) to be utilized in the various DoD commands and Federal agencies. A measure of AFIT CAM program usefulness was developed by obtaining feedback from those graduates who had experienced the graduate education process. Furthermore, a measure of AFIT CAM program usefulness from graduates and supervisors aided in current management of the AFIT CAM program.

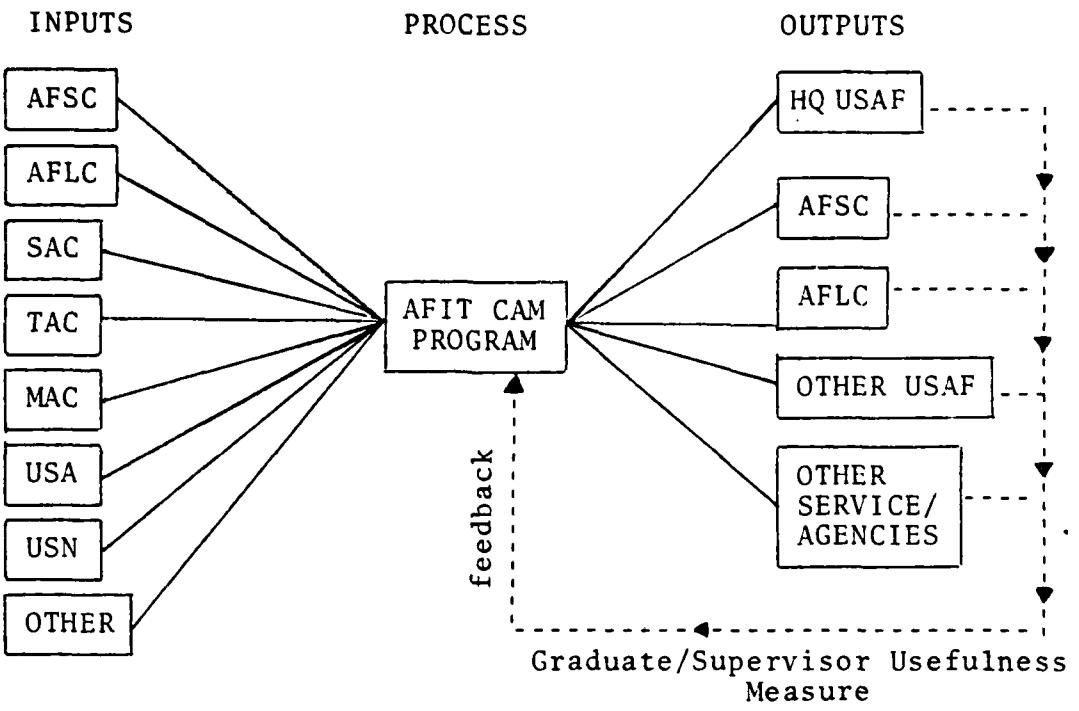

Fig 1.2. Model of AFIT CAM Usefulness

Problem Statement

A measurement of AFIT CAM program usefulness from the viewpoint of its graduates and their supervisors did not exist. As a result, it was not known how well the AFIT CAM program has achieved established educational goals nor how well the AFIT CAM program has been managed since its inception. Furthermore, a demographic profile of AFIT CAM graduates did not exist. This profile was needed to establish an AFIT CAM graduate feedback network to aid in future curriculum development and overall program management decisions.

Research Questions and Supporting Hypotheses

In order to obtain solutions to the problem statement, the following research questions were analyzed:

1. What are the perceptions of active duty Air Force military and civilian AFIT CAM graduates and their supervisors regarding the usefulness of a graduate AFIT CAM education in postgraduate assignments?
2. What is the demographic profile of active duty Air Force military and civilian AFIT CAM graduates?
3. What are the most/least useful subject areas in the AFIT CAM curriculum as perceived by active duty Air Force military/civilian graduates and their supervisors?

The specific qualitative research hypotheses developed to answer Research Question One were:

1. Active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful in postgraduate assignments.
2. Supervisors of active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful to their subordinates in postgraduate assignments.
3. There is no significant difference between active duty Air Force military and civilian AFIT CAM graduates' and their supervisors' perceptions of AFIT CAM program usefulness.
4. Active duty Air Force military and civilian AFIT CAM graduates' perceptions of AFIT CAM program

usefulness do not change over time.

There were no research hypotheses associated with Research Question Two due to the nature of demographic data. A qualitative assessment of collected information was provided to aid in future AFIT CAM program management decisions. Research Question Three was answered by ranking the median scores of Likert scale responses from AFIT CAM graduates regarding the most/least useful subject areas in the AFIT CAM curriculum.

Justification

Feedback from the user's standpoint was necessary to verify the educational benefits of the AFIT CAM program. Zemansky and Gordon noted that

> Educational institutions need the help of practicing purchasing (contract) managers who recognize their obligation to aid in the educational process and in redefining the curriculum to make it relevant, current and effective [50:96].

Several research studies measuring the usefulness of a graduate education received at the AFIT School of Systems and Logistics have previously been accomplished (10; 13; 15; 20; 21; 25; 29). However, no research had been conducted which measured feedback on the usefulness of an AFIT CAM education in postgraduate assignments. Furthermore, this research was of interest and practical importance to:

1. The Air Force Director of Contracting and Manufacturing Policy, Major General Joseph H. Connolly, sponsor of the AFIT CAM program.
2. The AFIT CAM Option Coordinator, Captain Donald L. Brechtel.

3. The graduate faculty of the Department of Contracting Management.

General Research Plan

The general research plan concentrated on the perceptions of AFIT CAM graduates and supervisors regarding usefulness of the program. The vehicles for obtaining these perceptions were two attitudinal surveys. The surveys were divided into the following three parts: Demographic, Perceptions, and Open-Ended Response questions. Six of the perception questions were assigned to each of the research hypotheses associated with Research Question One. Nonparametric statistical tests were utilized to measure the perceptions of graduates and supervisors to evaluate each of the research hypotheses. The demographic questions in the survey instruments were used to answer Research Question Two. Finally, the remaining perception questions and the open-ended questions were used in conjunction with Research Question Three.

Key Definitions

It is important to define several key terms used frequently throughout this research in order to form a common frame of reference.

1. Usefulness - The quality or state of being useful; conduciveness to an end; utility (19:986). In the context of this research, a graduate's AFIT CAM education is useful if it is of practical use in job performance. This definition of usefulness was incorporated in the structure of questions

in the questionnaire.

2. Contract Manager - The term "contract manager" as used in this research includes the entire gamut of individuals working in the Air Force Specialty Code (AFSC) 65XX as well as Government civilians in the 1100/1200 series. The functions of contract managers as used in this research include, but are not limited to: requirements generation, contract planning, negotiations, contract award, production/manufacturing, quality assurance, contract modifications, purchasing, contract administration, and contract closeout. Thus, the term "contract manager" covers a broad spectrum of functional jobs related to Government procurement (40:19-32).

3. Procurement - Purchasing, renting, leasing, or otherwise obtaining supplies or services; includes all functions related to obtaining supplies and services, including description (but not determination) of requirements, selection and solicitation of sources, preparation and award of contracts, and all phases of contract administration (16:5[illegible].

4. Acquisition - Acquiring supplies or services by contract with appropriated funds by and for the use of the Federal Government through purchase, lease, or barter, whether the supplies or services are already in existence or must be created, developed, demonstrated, or evaluated; includes contract definition, product development, test and evaluation, procurement, production, and deployment/installation (16:11). For the purposes of this research, the term "acquisition" encompasses the term "procurement."

Overview of the Study

This research project is reported in five chapters. Chapter 1 has: 1) introduced the need for contract manager education and provided background/origins of the AFIT CAM program; 2) stated the purpose/justification for the research including the research problem, the research questions, and qualitative hypotheses; and 3) outlined the general research plan and defined key terms. Chapter 2, Literature Review, will: 1) provide an in-depth review of the legislative history and formation of Federal agencies related to Government procurement education; 2) orient the reader to the existing availability of Government-wide procurement education; and 3) review previous AFIT graduate research efforts and other pertinent information on the usefulness of various educational programs. Chapter 3, Research Methodology, will: 1) discuss the construction of the research questionnaire; 2) validate questions used to measure graduate and supervisor perceptions of AFIT CAM program usefulness; and 3) discuss statistical tests to be employed in analysis of the data. Chapter 4, Data Analysis, will address the three research questions and analyze the results from questionnaires issued to the target population using the methodology developed in Chapter 3. Chapter 5, Summary, Conclusions, and Recommendations, will: 1) synthesize research findings and state implications of the research; and 2) propose recommendations for future research in the area of educational usefulness.

CHAPTER 2

LITERATURE REVIEW

Background

The origin of graduate education programs specializing in Federal acquisition began with the legislative history creating the Commission on Government Procurement (COGP). On January 3, 1969, Representative Chet Holifield introduced a House Bill, H.R. 474, proposing creation of a Government commission to conduct a comprehensive review and study of Federal Government procurement policies and practices (6:166-167). A companion bill in the Senate, S.1707, quickly followed and was introduced by Senator Henry Jackson (6:167). Testimony of procurement specialists from Government and industry before the Military Operations Subcommittee on Government Operations supported formation of a commission for this purpose (6:167). As a result, Congress passed Public Law 91-129, which established the COGP (44:139).

The purpose of the COGP was to study and investigate: 1) existing statutes affecting Government procurement; 2) procurement policies, rules, regulations, procedures and practices followed by all organizations in the Executive branch of the Government; and 3) the procurement organizations themselves (6:168). The COGP received thousands of pages of

procurement reports, Congressional testimony and documents; consulted approximately 12,000 people engaged in procurement; conducted more than 2,000 meetings at over 1,000 Government, industry, and academic facilities; received responses to questionnaires from nearly 60,000 individuals affected by Government procurement (44:vii-viii). The COGP completed this exhaustive study in December 1972, and presented 149 recommendations to the Congress (44:185-199). The five-volume, ten-part Report of the Commission on Government Procurement affected "virtually every aspect of procurement from policy to statute and from acquisition of major systems to acquisition of commercial products [6:171]." The Report affected procurement education as well. This was particularly evident in the COGP Recommendations 1, 15, 16, and 21.

COGP Recommendation 1 proposed the establishment of a central Office of Federal Procurement Policy (OFPP) to solve procurement problems caused by "the lack of central executive branch leadership in developing policy and effectively maintaining ongoing procurement operations [44:12]." It states:

> Establish by law a central Office of Federal Procurement Policy in the Executive Office of the President, preferably in the Office of Management and Budget, with specialized competence to take the leadership in procurement policy and related matters. . . [44:9].

Congress passed Public Law 93-400 on August 30, 1974, formally establishing the OFPP within the Office of Management and Budget (18:19).

Among the many intended functions proposed for the new OFPP was its task to:

> develop and promote programs for the upgrading of procurement personnel, including recruitment, training, career development, and standards of performance and the conduct and sponsorship of research in procurement policy and procedures [44:13].

This task was carried out by an OFPP Administrator, a position established under Section 5(b) of Public Law 93-400. Section 6(d) of this law describes the Administrator's functions (45: 905). Two OFPP Administrator functions relate directly to Government-wide procurement education:

> (1) Promoting and conducting research in procurement policies, regulations, procedures, and forms.
>
> (2) Recommending and promoting programs of the Civil Service Commission and executive agencies for recruitment, training, career development, and evaluation of procurement personnel [45:905-906].

The significance of these functions may be seen from the comments made in the Legislative History of the U.S. Code (46: 4601):

> This function (promoting research) was to provide OFPP with the wherewithal to avoid the formulation and promulgation of procurement policies and regulations without hard facts achieved through comprehensive research or operating experience. The provision would foster innovation and creativity and would permit orderly development of promising procurement techniques before committing large sums of money.
>
> This provision (programs for recruiting and training) recognizes that lasting improvements in the procurement process can only be achieved with personal programs designed to equip the procurement work force to cope with the increasingly complex demands of contemporary buying.

Two other COGP recommendations affected Government-wide procurement education programs; in particular, Recommendations 15 and 16 (44:186).

> Recommendation 15. Assign to the Office of Federal Procurement Policy responsibility for: (a) Developing

> and monitoring, in cooperation with the procuring agencies and the Civil Service Commission, personnel management programs that will assure a competent work force. (b) Defining agency responsibilities and establishing standards for effective work force management and for development of a Government-wide personnel improvement program. (c) Developing and monitoring a uniform data information system for procurement personnel.
>
> Recommendation 16. Establish a recruiting and trainee program to assure development of candidates for procurement positions in all agencies, at all levels, and in all required disciplines. Special attention should be given to college recruitment to obtain young workers capable of being trained through experience and additional formal education to provide the managerial staff required a decade from now.

Recommendations 15 and 16 reflected COGP concern that no single source could identify how many people were engaged in procurement, what skills were necessary, or how such skills were being provided (44:46). Furthermore, no agencies possessed long-range plans for recruitment and training of procurement personnel. This existed despite the fact that one-fourth of the procurement work force was eligible for retirement within five years at the conclusion of the study; one-half the work force was eligible to retire within ten years (44: 46). The COGP also determined that: 1) agency recruitment programs were largely based on reaction to impending changes in current workload rather than forecasted workload or potential losses; 2) only small numbers of college graduates were being placed in the procurement work force; and 3) only about half of the agencies visited during the study conducted formal intern or trainee programs; most of these did not provide a well-balanced or comprehensive approach (44:48).

It is in COGP Recommendation 21, however, that the need

for graduate education programs specializing in Government procurement became most apparent.

> Recommendation 21. Establish a Federal Procurement Institute which would include undergraduate and graduate curricula, procurement research programs, executive seminar programs, and other academic programs [44:51].

The COGP determined that

> existing schools, courses, and formal education programs--some of which are excellent--do not adequately provide the special training needed to sustain the highly competent procurement work force required to handle the major contracting efforts of the Government [44:51].

Moreover, existing schools and programs of instruction in procurement were found to vary significantly from one agency to another (44:51). No school or program was dedicated solely for the purpose of upgrading procurement education throughout the Government; all existing schools had broader missions involving teaching of courses other than procurement (44:52). The COGP felt that the existing fragmentation of procurement training resulted in: 1) redundant training efforts; 2) voids in curriculum, particularly with respect to the management level; and 3) problems with the currency of course offerings (44:52).

As a result, Recommendation 21 proposed establishment of the Federal Procurement Institute (FPI) to assume centralized responsibility in providing training, performing research, and charged with the general advancement of the field (39:118). In the field of research, the proposed FPI would (44:52):

> Conduct and sponsor research in procurement policy and procedure.

Establish and maintain a central reporting and research library in the field of Federal procurement and grants.

Offer a program, similar to Sloan Fellowships, for Federal and industry personnel providing a period of study and research at the Institute or related institutions.

Maintain a liaison with professional organizations; participate in intergovernmental and international procurement conferences and related activities.

In the field of education, FPI would (44:53):

Formulate comprehensive education and training plans in cooperation with all agencies.

Monitor education and training efforts throughout Government, industry, and the academic community, to include studies of the appropriateness and adequacy of such efforts.

Sponsor and publish studies and research materials relating to education for procurement operations and management.

Sponsor training for the faculties of schools instructing in procurement and related subjects.

Assist universities that wish to develop bachelor degree programs in the field of procurement.

Develop and conduct executive seminar programs in procurement, available to State and local governments and to contractor personnel.

Develop and conduct executive seminar programs for procurement management personnel.

Pursuant to the COGP recommendations published in December 1972, an Interagency Task Group was convened to analyze the feasibility of establishing a Federal Procurement Institute (39:118). The Interagency Task Group made their final report in July 1974, and acknowledged the need for the FPI. In 1976, the FPI was established within the Department of Defense which was its initially assigned executive agency (27: 56). In 1978, the Federal Procurement Institute was renamed the Federal Acquisition Institute (FAI) (26:23). As a result

of Public Law 96-83, the Office of Federal Procurement Policy Act Amendment of 1979, the FAI became an integral part of a different executive agency, the Office of Management and Budget, where it remains today (24:6).

The goals of today's FAI remain basically the same as when the Institute was created. The FAI is

> responsible for recommending and promoting programs for recruitment, training, career development, and performance evaluation of procurement personnel to improve the overall performance and professional stature of the procurement workforce [24:6].

As a means of achieving this goal, the FAI is actively engaged in promoting educational programs to develop professionalism in the procurement career field (23:7). In this role, the FAI acts as a high-level project office, planning educational programs and working with the military services, colleges, and universities to carry out the program. The FAI attempts to

> pull together, streamline, and economize the diverse procurement training and education programs now offered by various federal agencies in order to meet the needs of both the procurement manager and the individual procurement professional [27:57].

The FAI does not replace, duplicate, or assume control of agency programs. FAI fulfills the need for coordination and leadership in planning, implementing, and evaluating agency and Government-wide programs. This goal is especially challenging, given the wide and diverse field of procurement education that is available to contract managers.

Acquisition Education

Acquisition education for contract managers is available from a wide variety of sources, both internal and external to the Government. Taken as a whole, these educational resources offer contract managers an opportunity to expand both their knowledge and skills in the specific yet diverse field of acquisition. The Federal Acquisition Institute gives high priority to education programs in its quest for increased productivity, performance, and above all, professionalism within the acquisition workforce (7:5).

The spectrum of acquisition education available to contract managers is wide in scope. The methods available for obtaining this knowledge are just as diverse. Raisters (38: 91) categorized eight methods through which an individual can obtain the necessary education in the acquisition field. These eight methods are represented in Figure 2.1 (38:97). Raisters stated that formal academic programs were the best and quickest method available to obtain an acquisition education (38:105). However, Raisters stated that professional organization seminars and workshops and Government agency programs also served as excellent sources of acquisition education (38:100).

The core of formal acquisition education programs can be broken down into four major categories: acquisition and contracting; legal; financial; and related skills (39:123). Acquisition and contracting is concerned with topics related to the contracting, procurement, purchasing, and acquisition

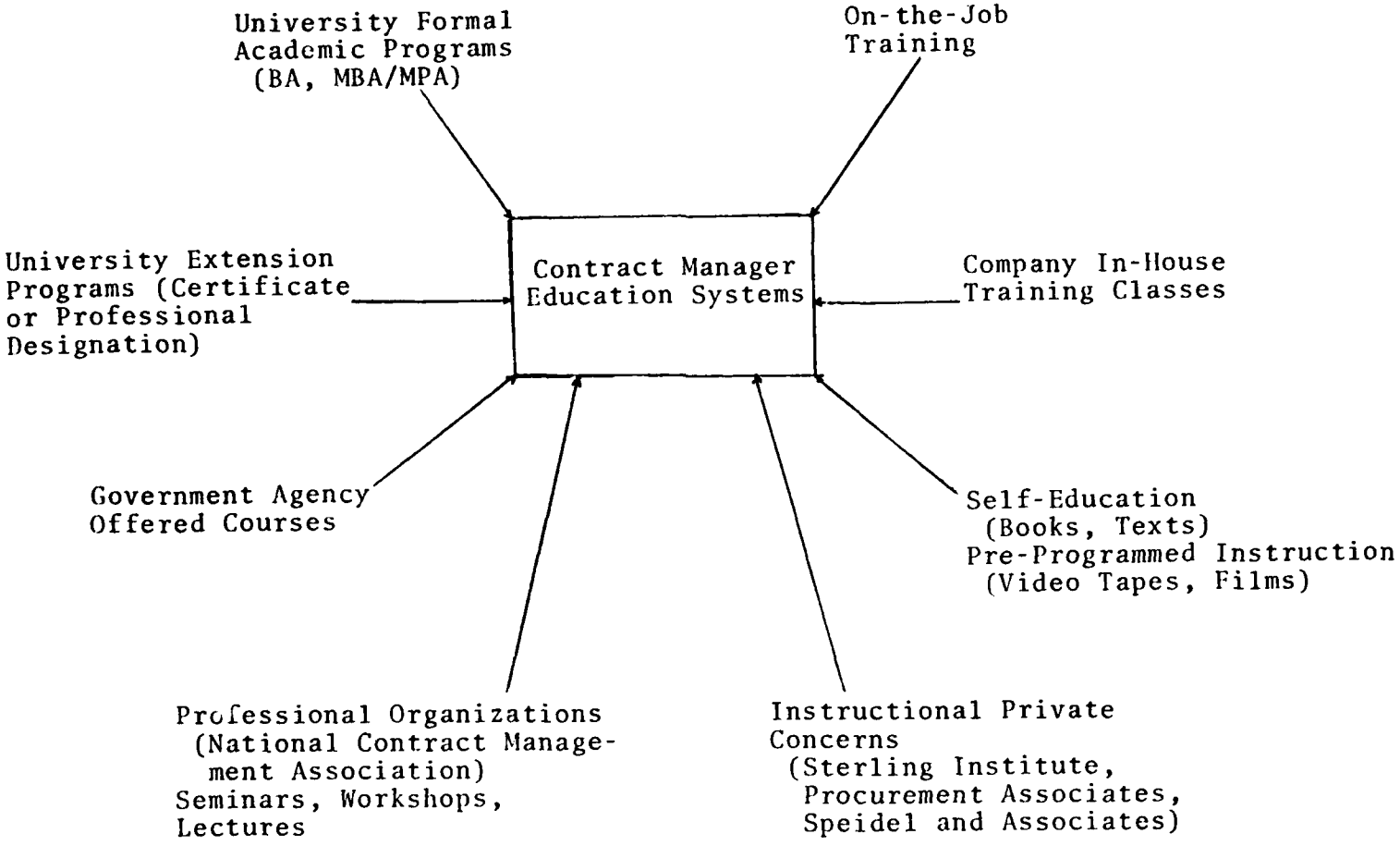

Fig 2.1. Sources of Acquisition Education

functions. The legal category covers the business, commercial and contract law fields, including patents and royalties, technical data, claims, disputes, and terminations. The financial category involves the area of pricing and cost analysis relative to contract proposal preparation, negotiation, settlements, and cost accounting standards. Related fields of study include program management, project management, logistics management, economics, the quality function, and data processing.

Over 250 colleges and universities conduct formal education programs in acquisition and related subjects (35). A majority of these schools, however, do not offer enough instruction to constitute a major or minor field of study in purchasing or contracting for a college degree candidate (36: 13). The Federal Acquisition Institute is currently working on this problem by attempting to establish a common body of knowledge for the acquisition career field. FAI's overall objective is to establish continuing education, associate, baccalaureate, graduate degree, and certificate programs in colleges and universities near major work force centers in the United States (23:7).

Professional organizations in the field of acquisition also provide valuable educational programs to contract managers by offering speaker programs, special seminars, and workshops (38:100). These activities provide an arena or forum where the latest professional information is disseminated, changed, and adapted. Professional organizations also conduct

certification programs to recognize and insure competence among contract managers. Three such programs are: 1) the Certified Purchasing Manager (CPM) offered by the National Association of Purchasing Management; 2) the Certified Professional Contracts Manager (CPCM) program conducted by the National Contract Management Association; and 3) the Certified Public Purchasing Official (CPPO) program offered under the joint auspices of the National Institute of Governmental Purchasing and the National Association of State Purchasing Officials (50:97).

Government-sponsored acquisition educational programs are yet another valuable source of education for contract managers. On the civilian side of Government acquisition, three significant schools are in existence: 1) the U.S. Civil Service Commission, Bureau of Training, Management Sciences Training Center, Washington D.C.; 2) the Federal Supply Service, General Services Administration, Interagency Branch, Arlington, Virginia; and 3) the Graduate School, U.S. Department of Agriculture, Washington D.C. (39:123, 125). The bulk of Government-sponsored acquisition education programs, however, are situated within the Department of Defense (39:123). Most of the courses offered are short courses of six to eight hours per day of a one-week to ten-day duration. In general, these schools are limited to military or civilian personnel from Federal agencies, Congressional staffers, state and local governments, and a small number of foreign students (39:123). Significant DoD-sponsored schools offering acquisition

education are: 1) the U.S. Army Logistics Management Center (ALMC), Fort Lee, Virginia; 2) the U.S. Naval Material Command (NAVMAT), Arlington, Virginia; 3) the U.S. Army Management Education and Training Agency (AMETA), Rock Island, Illinois; 4) the Air Training Command (ATC) Technical Training Center, Lowry AFB, Denver, Colorado; 5) the Naval Postgraduate School, Monterey, California; 6) the Defense Systems Management College (DSMC), Fort Belvoir, Virginia; and 7) the Air Force Institute of Technology (AFIT), School of Systems and Logistics, Wright-Patterson AFB, Ohio (14:12-13; 39:124-125; 47:263). Only two of these schools offer graduate degree programs with a concentration in contracting and acquisition management. The Naval Postgraduate School offers a graduate-level Acquisition and Contract Management curriculum; the Air Force Institute of Technology (AFIT) offers a graduate-level Contracting and Acquisition Management curriculum (1:115; 14:12).

Within the DoD, there are essentially three levels of contracting and acquisition that require education and training on a continuous basis: base, central, and systems-level acquisition. Base-level contracting is local in nature. It is the acquisition of materiel or services by an installation for consumption at the installation or its satellite activities (16:546). Central contracting is consolidated procurement covering the requirements of two or more ordering agencies; it is the "process of acquiring material to meet consolidated department-wide requirements [16:546]."

Systems-level contracting relates more to the acquisition of weapon systems and supporting equipment (16:11). The DoD services, as well as other Government agencies, conduct contracting operations at each of these three levels of contracting and acquisition management.

Figure 2.2 illustrates the interrelationships among the various levels, sources, and users of acquisition education. For example, the Air Force Institute of Technology (AFIT) Contracting and Acquisition Management (CAM) program offers the various users a systems-level, graduate education program originating from Governmental educational sources. A different example is the AFIT Education With Industry (EWI) program which offers a program option with concentration in contracting and manufacturing (1:176). This EWI option also provides the Air Force with a systems-level acquisition education for contract managers, but instead utilizes private education and training sources. It is a ten-month, non-degree internship with defense contractors that provides Air Force officers with a unique view of the corporate side of weapon system acquisition.

The AFIT Contracting and Acquisition Management (CAM) and Education With Industry (EWI) programs are only two of the many educational programs offered through AFIT. Each program lies within AFIT's much broader educational mission. Since it is the AFIT CAM program that is the focus of this research, it is now necessary to trace its functional location within AFIT as well as a detailed description of the program's

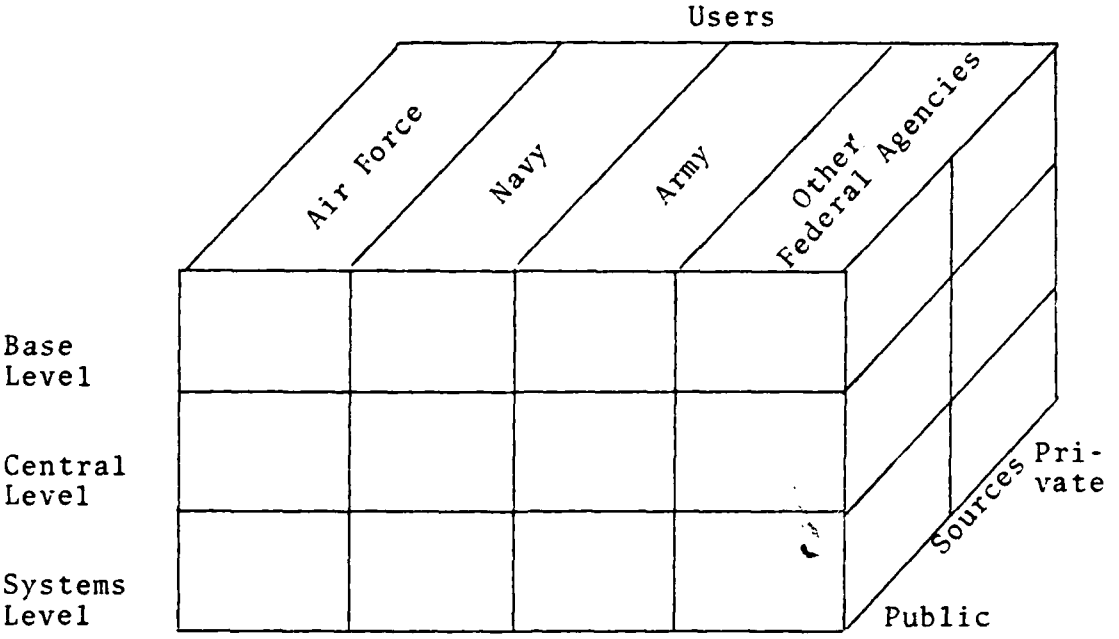

Fig 2.2. Acquisition Education Cube

purpose and curriculum.

AFIT

The Air Force Institute of Technology (AFIT), located at Wright-Patterson AFB, Ohio, is a component of Air University within the Air Training Command. AFIT's mission is "to provide education to meet Air Force requirements in scientific, technological, managerial, medical, and other fields as directed by HQ USAF [1:2, 4]." AFIT provides education programs through the School of Engineering, School of Civil Engineering, School of Systems and Logistics, and Civilian Institution Program (1:4). All but the Civilian Institution Program are taught in residence at Wright-Patterson AFB. Of relevant interest to this research project is the School of Systems and Logistics. This AFIT School conducts the

Contracting and Acquisition Management (CAM) graduate education program.

AFIT School of Systems and Logistics

The AFIT School of Systems and Logistics is the Air Force center for education and research programs related to management of a variety of defense systems (1:114). The School of Systems and Logistics has three broad missions:

> to provide educational programs, research, and consultative services concerned with managing defense, civil engineering, logistics, and systems programs and activities [1:115].

The School of Systems and Logistics provides programs and services developed and conducted in response to Department of Defense (DoD) and Air Force requirements. Three educational programs are offered: the Graduate Management Program, Professional Continuing Education Program, and Correspondence Course Program (1:115).

The primary purpose of the School of Systems and Logistics Graduate Management Program is to provide selected graduate military and civilian managers with an education designed to enhance their ability to effectively analyze, design, and manage complex defense systems in order to meet Air Force and DoD needs in the area of Civil Engineering Management, Logistics Management, and Systems Management (1:117). The educational objectives of the School's Graduate Management Program are to help students:

> 1. Apply systems theory to the analysis of complex problems and decision situations;

2. Conduct research in solving problems and making decisions concerned with the management of complex systems;

3. Apply fundamental concepts and techniques of descriptive and inferential statistics to problem analysis and decision-making under conditions of uncertainty and risk;

4. Use fundamental management science concepts and techniques to improve problem analysis and decision-making effectiveness;

5. Communicate effectively, both orally and in writing;

6. Apply basic concepts and techniques of organization theory and behavior relevant to managing complex organizations;

7. Apply management information systems concepts to effectively support the decision-making structure and processes in a complex organization;

8. Apply basic concepts and techniques of economic analysis, financial management, and accounting in acquiring and controlling the financial resources to support the operations of a complex organization;

9. Describe and, where appropriate, apply fundamental concepts and techniques for acquiring/providing products or services by contract;

10. Evaluate systems for the effective and efficient production and distribution of those goods and services an organization provides its customers; and

11. Integrate and apply concepts and techniques acquired in all of the course work included in a particular curriculum to the analysis and development of organization policy [2].

Three fully-accredited Graduate Management Programs lead to the award of the Master of Science degree: the Graduate Engineering Management Program, Graduate Systems Management Program, and Graduate Logistics Management Program (1: 115). All graduate programs are fifteen months in duration. The Graduate Engineering Management Program provides civil engineering officers with a graduate educational program designed to improve their effectiveness in managing civil

engineering activities. The Graduate Systems Management Program provides students from various systems, research and development, engineering, and analysis career fields with a graduate educational program designed to improve their effectiveness in managing programs for which they will be responsible. The Graduate Systems Management Program offers majors in Engineering Management, Research and Development Management and Systems Management. The Graduate Logistics Management Program provides students from various logistics career fields with a graduate educational program designed to improve their effectiveness in managing a variety of logistics systems and related programs. The degree is offered with majors in Acquisition Logistics Management, Logistics Management, International Logistics Management, Maintenance Management, and Contracting and Acquisition Management. Figure 2.3 briefly summarizes the functional location of the Contracting and Acquisition Management (CAM) option within the educational hierarchy of AFIT and the Air Training Command.

In response to its educational mission, the School of Systems and Logistics is also responsible for developing Professional Continuing Education and Extension Correspondence Institute courses. The Professional Continuing Education (PCE) program offers courses designed to provide educational opportunities for practicing logisticians and systems managers (1:115). Courses are developed and modified as required to meet the changing educational needs in the operational agencies of DoD, Air Force, and/or the major commands. Courses

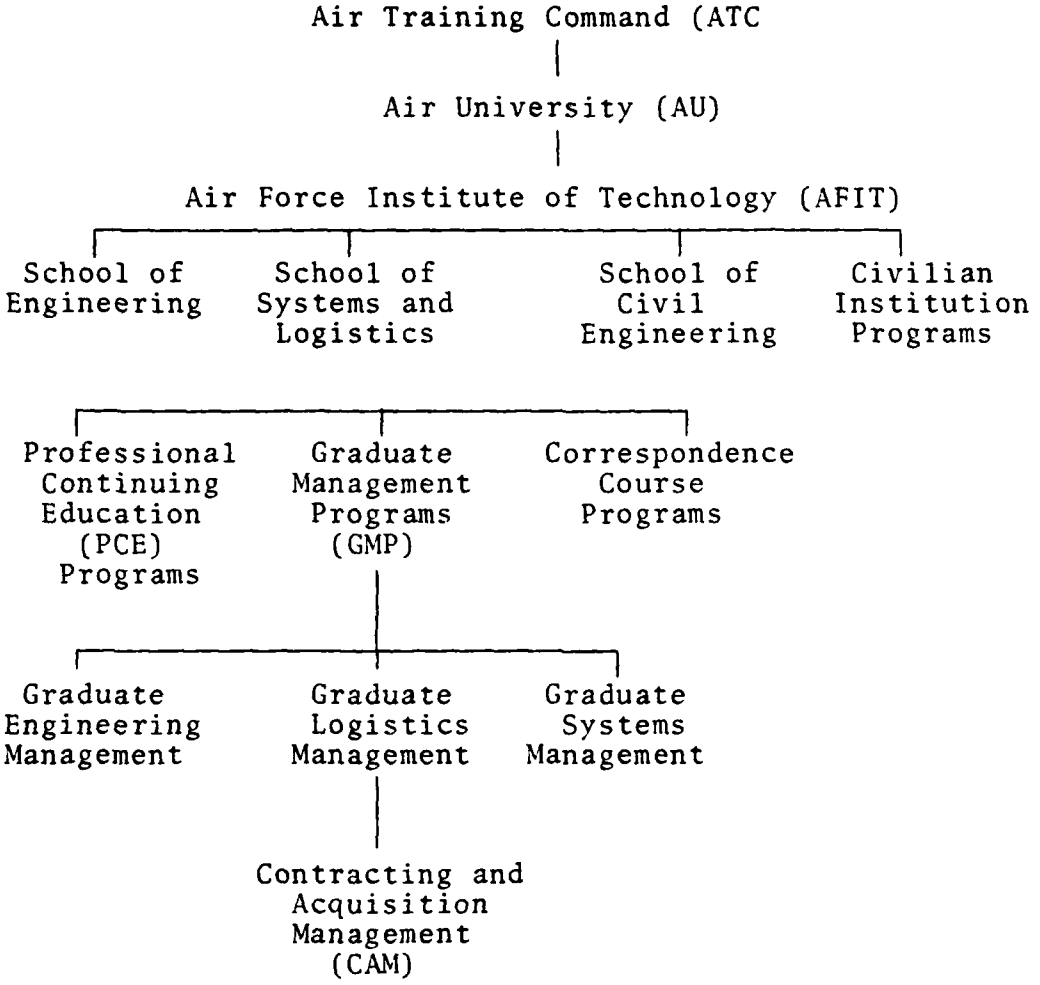

Fig 2.3. AFIT CAM Flowchart

are conducted in residence or on-site in both the United States and overseas. The School is also responsible for preparing texts and manuscripts used by the Extension Course Institute (1:115). These instructional materials are used for teaching PCE courses in residence or on-site.

The second mission of the School of Systems and Logistics is to provide research focusing on the management of various defense engineering, logistics, research and

development, and systems programs and activities (1:115). In general, the research is accomplished through either graduate thesis research or faculty research. Students in the respective graduate management programs are required to conduct research and write a thesis on significant problems or issues of concern to managers in career fields related to the student's major program of study. The primary purpose of the thesis research is to provide the student with a practical and realistic opportunity to integrate and apply the concepts and techniques acquired in the various courses defining the student's particular curriculum. As a product of the student thesis program, the Air Force receives valuable research which would otherwise be purchased by contract or consume other in-house services. The School of Systems and Logistics faculty also conducts independent research into problems and issues of interest to defense logistics, engineering, and research and development managers. Results and recommendations are published as technical reports and are made available to concerned agencies in the DoD community.

The third mission of the School of Systems and Logistics is to provide consultative services in the management of defense engineering, logistics, and research and development systems and programs (1:116). In this consultant capacity, the faculty of the School assists requesting agencies with the analysis and resolution of real-world problems by applying the latest and most appropriate management technology. Having discussed the mission of AFIT, the School of Systems and Logistics, and the

functional location of the AFIT Contracting and Acquisition Management (CAM) program, the mission and curriculum of the AFIT CAM program is reviewed in the following section.

AFIT CAM

The AFIT CAM program comes under the direction of the Department of Contracting Management, one of five academic departments within the School of Systems and Logistics. Other academic departments are: Logistics Management, Organization Sciences, Communication and Humanities, and System Acquisition Management (1:119). The Department of Contracting Management develops and administers both graduate and professional continuing education courses concerned with theoretical and applied aspects of contracting management (1:116). The department's Graduate Management Program in Contracting and Acquisition Management (CAM) is designed to "prepare students to assume a managerial role in the contracting community [1: 118]." The AFIT CAM program provides students with a systems perspective in the overall logistics field and a strong foundation in quantitative methods and management concepts, particularly relevant to contracting and acquisition management. The School of Systems and Logistics FY81 Annual Evaluation Report further states:

> The general objective of this [CAM] option is to provide graduates with the knowledge and skills necessary to specify, evaluate, and manage the human, financial, material, and contractual resources they will direct in future assignments as middle and upper level managers in the contracting management career field. In addition to providing the students with a systems perspective of the overall logistics field, special

courses permit the student to investigate areas of contracting and acquisition in greater depth [4:140].

The Contracting and Acquisition Management Major is conducted in six academic sessions. The first four-week session provides intensive review courses in mathematics, accounting, and computers. The first four-week session is followed by five eleven-week graduate quarters. The AFIT CAM graduate program is fifteen months in duration. AFIT Pamphlet 53-20 succinctly describes the AFIT CAM curriculum:

> The graduate curriculum for the Contracting and Acquisition Management major consists of 11 integrated core courses, four specially designed contracting courses, two elective courses, plus 12 hours of thesis study. The core courses extend students' knowledge and understanding of quantitative methods, logistics interrelationships, and management concepts. The special courses permit students to investigate areas of contracting in greater depth. Electives are designed to broaden students' interests or to provide in-depth study in a specific area. Theses topics typically address current contracting and acquisition management problems and provide the opportunity to conduct practical research. Many theses topics are provided by DOD/USAF agencies interested in sponsoring student research. The curriculum for the Contracting and Acquisition Management major is listed below in the sequence offered:
>
> Review Term
> - Elements of Financial and Cost Accounting
> - Introduction to Computers
> - Quantitative Methods for Managers
> - Research Orientation
>
> Qtr I (Summer)
> - Federal Financial Management
> - Economic Analysis and Public Policy
> - Applied Statistics for Managers I
> - Quantitative Decision-Making
>
> Qtr II (Fall)
> - Contracting and Acquisition Management
> - Research and Technical Writing
> - Applied Statistics for Managers II
> - Management and Behavior in Organizations

Qtr III (Winter)
Cost and Price Theory
Maintenance and Production Management
International Logistics Management
Elective
Thesis Proposal

Qtr IV (Spring)
Legal Aspects of Contracting
Distribution Management
Independent Study (Thesis)
Elective

Short Term
Independent Study (Thesis)

Qtr V (Summer)
Contract Management Theory
Seminar in Acquisition Management
Independent Study (Thesis) [2]

Related Research

The purpose of this research effort was the measurement of AFIT CAM program usefulness as perceived by its graduates and their supervisors. While no previous research related directly to the authors' research problem, seven AFIT graduate student theses relate indirectly to this research project. In general, all of these previous research efforts measured various alumni perceptions of the AFIT School of Systems and Logistics. Thus, these earlier research efforts were similar in approach, yet different in focus. A review of these relevant studies highlights other approaches to a similar problem.

In 1965 Lieutenant Colonel Allan C. Hart conducted a study concerned with the utilization of education received at the School of Systems and Logistics, the extent to which the course objectives were met, and the evaluation of the

curriculum (21:7). A hypothesis test approach was used to analyze data collected from questionnaires distributed to 1963 and 1964 graduates. Hart concluded that the "Graduate Logistics Program fulfilled the role, mission, and objectives for which it was designed [21:57]."

In 1968 Second Lieutenants Robert Cook and John E. Greene examined the value of the existing School of Systems and Logistics curriculum relative to the needs of practitioners in the field (13:4). A survey instrument was used to solicit data from graduates of the School in the 1965-1967 year groups. Cook and Greene concluded that the School of Systems and Logistics taught subjects which graduates both need and use in the field (13:95).

In 1971 Captains Terry W. Hale and Basil E. Rooney performed a related study which measured the importance of education in management performance (20:1). A questionnaire was developed to test the hypothesis that "graduates of the Graduate Logistics Management Program perform their managerial responsibilities better than comparable officers without a graduate education [20:12]." Hale and Rooney concluded that the performance of graduates was superior to non-graduates in five of nine areas, which included decision-making, performance, planning, communications, and overall education (20:40-41).

In 1972 Captains Joseph E. Latt and Rick Harrelson studied the image of the School of Systems and Logistics as perceived by senior logistics managers (29:1). Using a questionnaire

for data collection, Latt and Harrelson determined that the School and its graduates were highly regarded by logistics managers in the field (29:41).

In 1978 Captains William N. Crowder and James A. Davidson conducted research on the usefulness of the School of Systems and Logistics graduate education program as perceived by graduates and their supervisors (15:9). A questionnaire was sent to graduates of the School who, in turn, hand-carried a similarly designed second questionnaire to their respective supervisors. The year groups surveyed were classes 1971-1975. Crowder and Davidson concluded that graduates felt the School of Systems and Logistics Graduate Management Program was useful; however, supervisors felt the program was even more useful than did graduates (15:57-58). An additional conclusion was that graduates felt they could be better utilized in positions other than those they currently held (15: 58).

In 1979 Captains Kenneth R. Brown and David M. Hollingsworth conducted another study "to determine the extent to which graduates of the AFIT School of Systems and Logistics have used the knowledge obtained from their graduate education in follow-on assignments [10:10]." Supporting objectives were: 1) to analyze the possibility of enhanced promotion potential resulting from an AFIT education; and 2) to determine and analyze overall usefulness of AFIT graduate management education as perceived by alumni (10:10). Brown and Hollingsworth considered an AFIT Graduate Management Program education

useful if it was perceived as having practical use in the graduate's job performance (10:18). Questionnaires were used to survey graduates from classes 1963-1978. Several conclusions were reached (10:57-59):

1. Graduates believed their chances in promotions increased as a result of attending AFIT.
2. Graduates felt an AFIT Graduate Management Program education was personally useful as well as useful to the Air Force.
3. Graduates perceived their supervisors having favorable opinions of the AFIT programs.
4. In general, graduates believed the AFIT Graduate Management Program curriculum was useful in their job.
5. Graduates often felt their education was underutilized in terms of job assignments received following graduation.

In 1980 Major Grantland W. Johns and Captain Philip M. Ray compared the usefulness of the AFIT Facilities Management Program in the School of Systems and Logistics with similar programs in civilian institutions. Perceptions of program usefulness were solicited from both AFIT resident and civilian institution graduates. A questionnaire was used to solicit response of 83 officers from the Facilities Management Program and 50 officers from similar programs at civilian institutions. Johns and Ray concluded that both programs were useful, but that the AFIT Graduate Facilities Management residence program

was more advantageous for officers due to its Air Force orientation (25:52-58).

In summary, the majority of previous research pertains to AFIT educational usefulness, but only at the School of Systems and Logistics level. Only Johns and Ray pursued educational usefulness research at an individual graduate education program level. Nonetheless, a review of all these efforts was productive. In particular, the research efforts of Crowder/Davidson and Brown/Hollingsworth were instrumental in designing the research methodology for this research effort.

CHAPTER 3

RESEARCH METHODOLOGY

Overview

In Chapter 1, the researchers defined the basic problem and formulated research questions and hypotheses. This chapter outlines the procedures utilized in answering the questions raised by this research effort. The researchers defined the graduate and supervisor samples of interest, developed a survey questionnaire to gather coded data, and described statistical tests and descriptive analyses to be performed based on the level of data gathered by this research. Finally, the assumptions and limitations of this research effort are presented.

Population

Survey participants were selected from two target populations: 1) current active duty Air Force officers and DoD civilians who have completed the graduate AFIT Contracting and Acquisition Management (CAM) program since its inception; and 2) the graduates' immediate supervisors (i.e., rating officials for military/performance appraisal officials for civilians). The total Air Force military/civilian CAM graduate population consisted of 153 people, of which 110 were

still on active duty at the time this research study was accomplished. Only selected members of the 1974B through 1981J classes (inclusive) were surveyed. Several categories of graduates and supervisors were excluded from participation in this research project. These categories and the rationale for their exclusion are as follows:

1. Supervisors of AFIT CAM graduates who were not presently assigned in the Contracting Career Field (65XX). The skills learned in the AFIT CAM program may not be required in other USAF positions and, hence, responses by these supervisors could bias the research results.
2. Other Military Service Students. The researchers were unable to locate these graduates due to time and other resource constraints.
3. Present AFIT Faculty. Due to their familiarity with this research effort and the subject area, AFIT graduates who presently serve on the AFIT faculty and their supervisors were excluded from this research to prevent potential bias to the research results.
4. Retired Students and Other Students Separated from the Air Force. The researchers could not locate these AFIT CAM graduates due to time and other resource constraints.

The two resulting samples represent an incomplete census of all graduates of the AFIT CAM program and the graduates'

immediate supervisors. However, due to the descriptive nature of this research, these samples were sufficient in measuring usefulness of the AFIT CAM program to the target population. As a consequence, the research results applied only to the two respondent groups of graduates and supervisors. Inferences to the overall AFIT CAM graduate population, and their supervisors, concerning usefulness of the AFIT CAM program were neither attempted nor implied.

After defining the target populations, questionnaires were mailed to 105 graduates and their immediate supervisors. In order to maintain complete anonymity among all participants, no attempt was made to pair the responses of graduates with the responses of their respective supervisors.

The Survey Instrument

General

After considering several data gathering techniques, the researchers determined that a mailed questionnaire would best satisfy the needs of this research effort. In making this determination, a wide geographical dispersion of the survey participants was an overriding concern. There were several advantages to using a mailed questionnaire, including lower cost per individual contacted and the ability to find individuals who might otherwise be inaccessible. Furthermore, the mailed questionnaire allowed respondents extra time to consider choices and make responses that most accurately reflect their views (17:283).

For this research effort, the mailed questionnaire was the only logical choice. With respect to this decision, Emory identified several disadvantages in the use of a mailed questionnaire (17:283). First, there is usually a strong bias of nonresponse and, as a result, the researchers have little control over the response rate. Second, there is a limit to the amount and type of information obtained via a mailed questionnaire. Survey participation tends to decline as the questionnaire becomes more complex. A general rule of thumb is that respondents should be able to answer the entire questionnaire in ten minutes (17:283).

Emory noted that the better educated respondents and those survey participants more interested in the topic tend to answer mailed questionnaires (17:283). Since the graduate AFIT CAM population is highly educated and population members have attended the program of research interest, the researchers believed that non-response bias would be low. Furthermore, the relatively short graduate survey consisted of 68 multiple choice questions and two short-answer free response questions (refer to Appendix A). The response time required for supervisors to answer the survey instrument was a serious concern of the researchers. In order to overcome the non-response bias of supervisors, the survey instrument for supervisors consisted of only 44 multiple choice and two short-answer free response questions (refer to Appendix B). This questionnaire design prevented the survey from becoming a burden on the supervisors' time.

A basic premise of this research was the guarantee of survey participants' anonymity. The purpose of the anonymity guarantee was to relieve the survey participants' concern that candid and honest answers would affect their professional careers (15:15). One consequence of the anonymity guarantee was the researchers' inability to determine the identities of survey non-respondents. This made impossible any attempt to accomplish a follow-up mailing to reduce non-response. The researchers made a concerted effort, however, to stimulate responses through careful design and execution of the survey instruments (17:283; 15:16).

The survey instruments identified in Appendices A and B are a synthesis of several previous research efforts (10; 11; 15). The researchers modified the instruments used in the previous research efforts in order to focus specifically on the graduate AFIT CAM program. The resulting survey instruments have the validity gained from previous research efforts as well as validation by experts in the field of contract management and research survey development (9; 34; 49).

Questionnaire Structure

In order to canvas AFIT CAM graduates and their supervisors, two separate questionnaires were used. The structure of the two questionnaires was very similar. Each questionnaire contained three sections. The first section, Demographics, was used to gather demographic data on both populations. Questions 1-25 in the graduate survey (see Appendix A) were

used to answer Research Question Two concerning the demographic profile of AFIT CAM graduates. The demographic data provided the basis for a variety of numerical tables that accurately described AFIT CAM graduate respondents.

Questions 1-4 in the supervisor survey (see Appendix B) provided limited demographic data but, more importantly, satisfied three other research requirements. First, an answer of "yes" (a) on Question 1 alerted the researchers that one supervisor questionnaire would be submitted for several AFIT CAM graduates under his/her supervision. Second, an answer of "no" (b) on Question 2 invalidated the entire questionnaire. Third, an answer of "yes" (a) on Question 3 identified the participant as both an AFIT CAM graduate and a supervisor.

The second section of both graduate and supervisor survey instruments, the Perceptions section, measured attitudinal perceptions of AFIT CAM graduates and their supervisors regarding usefulness of the AFIT CAM program. These two sections constituted the essential portion of the data collection design. Questions within the Perceptions section of each survey instrument fell into the following categories:

1. Usefulness of the AFIT CAM program as perceived by graduates (see Appendix A--Questions 26-30, 62, and 64-66) and supervisors (see Appendix B--Questions 5-9 and 42). These specific survey questions were utilized in answering Research Question One as well as all four of the qualitative

research hypotheses outlined in Chapter 1.

2. The applicability of the AFIT CAM curriculum to the duties performed by graduates in follow-on assignments. This applicability was measured by perceptions of graduates (see Appendix A--Questions 31-61, 63, and 68) and supervisors (see Appendix B --Questions 10-41, and 43). These specific questions were utilized in answering Research Question Three.

The only difference between the questions on the graduates' and supervisors' questionnaires, as identified in categories 1 and 2 above, was a minor wording change to accommodate the two different viewpoints. Three questions in the Perceptions section of the graduate survey were not replicated in the supervisor survey due to the nature of the questions (see Appendix A--Questions 64-66).

Questions 67 on the graduate survey and 44 on the supervisor survey were utilized in conjunction with the open-ended response questions in the third section of the survey instrument. These questions were used to determine if AFIT CAM graduates and their supervisors believed that incorporation of contracting-related AFIT Professional Continuing Education (PCE) courses into the existing AFIT CAM curriculum would be beneficial.

The third and final section of each of the survey instruments contained two open-ended questions concerning miscellaneous subjects of interest to the AFIT CAM Option Coordinator

and the AFIT Department of Contracting Management. These open-ended questions allowed participants to candidly respond to questions without the formal structure imposed by the multiple choice questions. The researchers informally analyzed the open-ended questions to ascertain respondents' feelings and expressions of intensity about the AFIT CAM program (17:219). Furthermore, responses to the open-ended questions were compared to the results found in answering Research Question Three.

The Measurement Scale

The ability to quantify the responses in the Perceptions section of both survey instruments was of extreme importance in answering the proposed research questions and supporting qualitative research hypotheses. The measurement scale used in both survey instruments was the seven-point Likert scale. The Likert scale consisted of the following seven possible responses:

a. Strongly Disagree
b. Disagree
c. Slightly Disagree
d. Undecided/Don't Know
e. Slightly Agree
f. Agree
g. Strongly Agree

This Likert scale allowed the researchers to measure the participants' level of agreement to each of the questions in the Perceptions section of both survey instruments (10:16).

The selection of the Likert scale was primarily due to the ease of construction and its discriminating ability in

respondent-centered research. That is, by using the Likert scale, the researchers were able to consider how responses differed among graduates and supervisors (17:250). Emory notes:

> a two-point scale, three-point scale, or scale with more points is a subject which is debated; there is little conclusive support for any particular scale-length. The agreement is that more points on a scale provide an opportunity for greater sensitivity of measurement [17:239].

As a result, the researchers determined that a seven-point scale would best satisfy the needs of this research effort.

The use of the Likert scale resulted in ordinal level data (17:250). Ordinal level data is defined as data which are ranked (least to most) with respect to a measured attribute, but the distance between ranked items is unknown (43: 38). The two attributes measured in this research were usefulness and applicability. These two attributes were measured via the seven-point Likert scale found in the survey instruments.

Distribution

The AFIT Personnel System Management Division (AFIT/ DPW) provided a computer-generated listing of those active duty Air Force officers and civilians who have graduated from the AFIT Contracting and Acquisition Management (CAM) graduate program since its inception, subject to the criteria established for the target population presented earlier in this chapter. Upon receiving this computer-generated listing, the researchers manually cross-checked with graduate records

maintained in the AFIT Registrar's Office (AFIT/RR) to ensure that the computer listing corresponded with official AFIT records.

The physical distribution of the survey instruments consisted of two phases. The first phase was to send to the AFIT CAM graduates a survey package containing the following items:

1. The graduate survey instrument with a self-addressed return envelope.
2. A sealed package containing the supervisor survey instrument with a self-addressed return envelope.

In the second phase, the AFIT CAM graduates were instructed to hand-carry the sealed supervisor package to his/her rating official (for military) or performance appraisal official (for civilians). This technique was utilized by the Crowder/Davidson research team with a high degree of success (15:21, 29).

Data Analysis Plan

As previously noted, the data measurements from the Perceptions section of each survey instrument were considered ordinal level data. As a result, the statistical analyses performed were nonparametric statistical tests. Siegel defines a nonparametric test as "a test whose model does not specify conditions about the parameters of the population from which the sample was drawn [41:31]." Furthermore, Siegel categorically states, "Parametric statistical tests, which use

mean and standard deviations . . . ought not to be used with data in an ordinal scale [41:26]." Thus, nonparametric statistical analysis of the Perceptions section data was justified. Analysis of the data in the Demographics section of the graduate survey was descriptive in nature. The technique utilized to analyze the demographic data consisted of a series of numerical tables. The analysis of the open-ended questions in the last section of the survey instruments consisted of a qualitative assessment by the researchers to determine if a consensus of opinion existed among the respondents concerning these questions. The research questions, supporting qualitative research hypotheses, and applicable survey instrument questions that comprise this study's research methodology are restated below:

Research Question One: What are the perceptions of active duty Air Force military and civilian AFIT CAM graduates and their supervisors regarding the usefulness of a graduate AFIT CAM education in postgraduate assignments?

Supporting Qualitative Research (Null) Hypotheses for Research Question One:

1. Active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful in postgraduate assignments.

2. Supervisors of active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful to their subordinates in postgraduate assignments.

3. There is no significant difference between active

duty Air Force military and civilian AFIT CAM graduates' and their supervisors' perceptions of AFIT CAM program usefulness.

4. Active duty Air Force military and civilian AFIT CAM graduates' perceptions of AFIT CAM program usefulness do not change over time.

Applicable Survey Instrument Questions:

Graduate Survey -- Questions 26-30, 62, and 64-66

Supervisor Survey -- Questions 5-9, and 42

Research Question Two: What is the demographic profile of active duty Air Force military and civilian AFIT CAM graduates?

Supporting Research (Null) Hypotheses for Research Question Two: Not applicable.

Applicable Survey Instrument Questions:

Graduate Survey -- Questions 1-25

Supervisor Survey -- Not applicable

Research Question Three: What are the most/least useful subject areas in the AFIT CAM curriculum as perceived by active duty Air Force military and civilian graduates and their supervisors?

Supporting Qualitative Research (Null) Hypotheses for Research Question Three: Not applicable.

Applicable Survey Instrument Questions:

Graduate Survey -- Questions 31-61, 63, and 68

Supervisor Survey -- Questions 10-41, and 43

Statistical Methodology

The appropriate measure of central tendency for ordinal

scale data is the median (17:115). The median may be defined as the centermost number of a data set arranged in ascending (or descending) order of magnitude such that half of the measurements fall below the median and half fall above (32: 43-44). If the total number of measurements are even, the median is the average of the two middle measurements, when the measurements are in ascending (or descending) order (32: 44). If the total number of measurements are odd, the median is the middle number of the ascending (or descending) arranged measurements (32:44). The median, as described above, was utilized throughout this research project to evaluate the research questions and hypotheses posed earlier.

To use the median, the seven-point Likert scale used in the survey instruments was converted from an alpha scale (i.e., a-g inclusive) to an arabic numerical scale (i.e., 1-7 inclusive). The purpose of this transformation was to enable the researchers to calculate numerical medians. The relationship between the survey instrument alpha scale and its numerical equivalent scale is as follows:

Alpha Scale	Adjective	Numerical Scale
a	Strongly Disagree	1
b	Disagree	2
c	Slightly Disagree	3
d	Undecided/Don't Know	4
e	Slightly Agree	5
f	Agree	6
g	Strongly Agree	7

For example, if a participant answered a question as "d" in the survey instrument, that answer was coded as a "4" by the researchers in determining a median response to that question.

The general technique used to evaluate (measure) perceived usefulness of the AFIT CAM program and to evaluate temporal changes in perceived usefulness involved a respondent's cumulative score. After a respondent's answers were converted to a numerical scale for each of the survey questions (i.e., Questions 26-30 and 62 for graduates, and 5-9 and 42 for supervisors), the respondent's cumulative score was the sum of the individual question numerical values. Research Hypotheses One through Four were evaluated using the set of all respondents' cumulative scores.

Before conducting any of the nonparametric tests associated with Research Hypotheses One through Four to evaluate Research Question One, the pertinent survey instrument questions were further validated using a contingency table analysis. The only survey questions used in the contingency table analysis were Questions 26-30 and 62 for graduates and Questions 5-9 and 42 for supervisors. These survey questions, hereafter called usefulness questions, were specifically written to measure the overall usefulness of the AFIT CAM graduate education. Contingency table analysis is a method of determining if a relationship exists in multinomial count data classified on two scales (32:530). In this research, the purpose of the contingency table analysis was to ensure that a respondent's cumulative score, as defined in the preceding

paragraph, was a valid measure of perceived usefulness of the AFIT CAM program. If, on some of the usefulness questions, the percentage of respondents who, for example, agreed to a particular question differed significantly from the percentage who agreed on the remaining questions, then that question would not have appeared to measure perceived usefulness of the AFIT CAM program. This is shown in the following example:

Question Number	% Agree	% Undecided	% Disagree
26	65	10	25
27	65	10	25
28	25	10	65
29	65	10	25
30	25	10	65
62	65	10	25

Clearly, the percentage of agreement responses to Questions 28 and 30 are inconsistent with the other four questions. If this situation were the case, then a respondent's cumulative score, the sum of individual question values, would be a sum of values that appear to measure perceived usefulness of the program as well as values that do not. Therefore, the total cumulative score would not represent a valid measure of perceived usefulness of the AFIT CAM program. The contingency table analysis used in this research protected against this undesirable state. If inconsistency in the usefulness questions occurred, then the question(s) that caused the inconsistency would be eliminated from further analysis.

For purposes of contingency table analysis only, the survey instrument response scale was recoded into three

categories (disagree, undecided, agree) from the seven-point Likert scale. The reason for this recoding was to avoid having frequency of responses less than five for any given response on the seven-point Likert scale. If all seven Likert scale responses had been used, the frequency of response to any of the seven response categories would have been smaller than those of the three recoded response categories. The researchers believed that with the seven response categories, contingency table analysis would not have provided the necessary measure of consistency to evaluate the remaining statistical hypotheses. And since contingency table analysis employs a Chi-Square statistic, the approximation to the sampling distribution should be avoided when the expected numbers are very small (i.e., less than five) (32:538). Therefore, responses of Strongly Disagree, Disagree, or Slightly Disagree were recoded under Disagree in the contingency table; and Strongly Agree, Agree, or Slightly Agree were recoded under Agree in the contingency table. A response of Undecided/Don't Know was coded directly into the contingency table.

To determine if the undecided responses biased the results of the contingency table analysis, the statistical test was conducted twice. The first statistical test combined the responses of "Disagree" and "Undecided" and compared this sum to the response of "Agree." The second statistical test combined the responses of "Agree" and "Undecided" and compared this sum to the response of "Disagree." The researchers believed that as a result of these combinations, a true measure

of consistency in the usefulness questions was obtained.

The null hypothesis (H_0) and alternative hypothesis (H_A) for the contingency table analyses were:

H_0: The answers to all usefulness questions are consistent with each other, in that the expected percentage responses for the usefulness questions are the same (i.e., the population percentages of agree, neutral, and disagree are the same for each question).

H_A: There exists inconsistency in the percentage responses of at least two of the usefulness questions.

The alpha level (α) in this analysis was .05. This alpha level represents a .95 probability of making the correct choice with the data, or a .05 chance of a Type I error (i.e., rejecting H_0 when H_0 is true)(32:222).

By rejecting H_0, the researchers would have concluded that there existed inconsistency in the percentage responses of at least two of the usefulness questions. By not rejecting H_0, the researchers would have concluded that there was insufficient evidence to indicate that inconsistency existed among the survey questions. In the event that the researchers rejected H_0, the questions which indicated inconsistency were eliminated from further analysis because the questions were not valid measurements of perceived usefulness of the AFIT CAM program. Following elimination, the contingency table analysis would have been reaccomplished with the remaining consistent questions. Upon determining the number of

consistent usefulness questions (i.e., 26-30 and 62 for graduates, and 5-9 and 42 for supervisors), a predetermined neutral score was calculated by multiplying the number of consistent questions by four, the neutral point on the Likert scale. For example, if all six usefulness questions were consistent, the predetermined neutral score was twenty-four.

Following validation of the usefulness questions, the four qualitative research hypotheses used in conjunction with Research Question One were individually evaluated. The statistical equivalent H_0 and H_A for Research Hypothesis One was:

H_0: The median graduate respondent's cumulative score $\leq$ 24 (i.e., the predetermined neutral score)

H_A: The median graduate respondent's cumulative score $>$ 24

$\alpha = .05$

By rejecting H_0, the researchers would have concluded that AFIT CAM graduates perceived the program as useful. By not rejecting H_0, the researchers would have concluded that there was insufficient evidence to indicate that AFIT CAM graduates considered the AFIT CAM program useful.

The statistical equivalent H_0 and H_A for Research Hypothesis Two was:

H_0: The median supervisor respondent's cumulative score $\leq$ 24 (i.e., the predetermined neutral score)

H_A: The median supervisor respondent's cumulative score $>$ 24

$\alpha = .05$

By rejecting H_0, the researchers would have concluded that the supervisors of AFIT CAM graduates perceived the program as useful. By not rejecting H_0, the researchers would have concluded that there was insufficient evidence to indicate that supervisors of AFIT CAM graduates considered the AFIT CAM program useful.

The statistical test utilized for Research Hypotheses One and Two is an extension to the Wilcoxon Signed Rank Test (12:211). This statistical test allowed the researchers to compare respondents' scores to a predetermined neutral score to ascertain whether respondents considered the AFIT CAM program useful.

The statistical equivalent H_0 and H_A for Research Hypothesis Three were:

H_0: The median graduate respondent's score = the median supervisor's score.

H_A: The median graduate respondent's score $\neq$ the median supervisor's score.

$\alpha = .05$

By rejecting H_0, the researchers would have concluded that there was a difference of opinion between graduates and supervisors on the usefulness of the AFIT CAM program. By not rejecting H_0, the researchers would have concluded that there was insufficient evidence to indicate that a difference of opinion existed between graduates and supervisors on the usefulness of the AFIT CAM program.

The statistical test utilized for Research Hypothesis

Three was the Wilcoxon Rank Sum Test (32:494). This test allowed the researchers to compare graduate respondent scores to supervisor respondent scores to determine if a difference of opinion existed.

The statistical equivalent H_0 and H_A for Research Hypothesis Four were:

H_0: Graduate median responses of AFIT CAM program usefulness do not change over time (no correlation).

H_A: Graduate median responses of AFIT CAM program usefulness do change over time (correlation).

$\alpha = .05$

By rejecting H_0, the researchers would have concluded that graduate perceptions of the usefulness of the AFIT CAM program either declined or improved over time. By not rejecting H_0, the researchers would have concluded that there was insufficient evidence to indicate that graduate perceptions of usefulness had changed over time.

The statistical test utilized for Research Hypothesis Four was the Spearman Nonparametric Test for Rank Correlation (32:513). This statistical test used the ranks of measurement to determine a measure of correlation (32:511). In this research, the two variables tested for correlation were graduate respondent cumulative score and the length of time (years) since graduating from the AFIT CAM program. Additionally, Questions 64-66 of the graduate survey directly asked graduates if their perceived usefulness of the AFIT CAM program had

changed over time. The results of graduate survey Questions 64-66 were used to further substantiate the results of the Spearman Rank Test in answering Research Hypothesis Four.

The research design used to answer Research Question Two involved nineteen numerical tables describing AFIT CAM graduates. These descriptive tables utilized responses to Questions 1-25 from the graduate survey instrument. The numerical tables enabled the researchers to establish a demographic profile of AFIT CAM graduate respondents. The following listing identifies the graduate survey instrument questions and the corresponding numerical table developed from those survey questions:

Graduate Survey Question Number	Applicable Numerical Table
2,3	AFIT CAM Graduate Respondents By Age Group (Table 4.3)
3,6,7	AFIT CAM Graduate Respondents by Graduation Rank/Grade and Present Rank/Grade (Table 4.4)
11	Current AFIT CAM Graduate Respondent Air Force Specialty Code (AFSC)/Job Series (Table 4.5)
12	AFIT CAM Graduate Respondents by Specific 65XX AFSC/Job Series (Table 4.6)
19	Graduate Respondent Current Job Description (Table 4.8)
16	Job Tenure of Graduate Respondents Currently Holding Contracting Jobs (Table 4.10)
13	Number of People Supervised by AFIT CAM Graduates Currently Holding Contracting Related Jobs (Table 4.11)
4,5,9	Graduate Respondent Assignments By Major Command or Other Designation (by Number) (Table 4.12)

Graduate Survey Question Number	Applicable Numerical Table
4,5,9	Graduate Respondent Assignments by Major Command or Other Designation (by Percentage) (Table 4.13)
8	Graduate Respondent Level of Assignment (Table 4.15)
21	Graduate Contracting/Manufacturing Experience Prior to Entering the AFIT CAM Program (Table 4.16)
23	Respondents With Pre-AFIT CAM Contracting Experience: Attendance at Lowry AFB/ Ft. Belvoir (Table 4.17)
23	Respondents Without Pre-AFIT CAM Contracting Experience: Attendance at Lowry AFB/ Ft. Belvoir (Table 4.18)
15	Graduate Respondent Contracting/Non-Contracting Assignments Since AFIT CAM Graduation (Table 4.19)
17	Number of Graduate Respondent Contracting-Related Assignments Since AFIT CAM Graduation (Table 4.20)
18	Graduate Respondent Contracting/Manufacturing Experience Levels (Table 4.21)
20	Graduate Respondent Assignments By Level of Acquisition (Table 4.22)
10	Current Graduate Respondent Educational Levels (Table 4.23)
22	AFIT PCE Courses Attended By Graduate Respondents Following AFIT CAM Program (Table 4.24)

For each of the survey questions identified above, the researchers summed the number of AFIT CAM respondents, placing the figures in the respective tables. To convert numerical response rates into percentages, the total number of respondents providing a given answer was divided by the total number

of research participants. These percentages were also placed in the respective tables.

There were four survey questions (i.e., 1, 14, 24 and 25) in the Demographic section of the graduate survey instrument that were not incorporated into numerical tables. Survey Question 1 was used to narratively describe responses by sex. Survey Question 14 was used in narrative description of AFIT CAM graduate respondents' perceptions of their supervisors' familiarity with the graduates' job. Finally, Survey Questions 24 and 25 were used in a narrative description of AFIT CAM graduate respondents' professional development activities since graduation.

The research design used to answer Research Question Three involved determining the most/least useful subject areas in the AFIT CAM curriculum as perceived by AFIT CAM graduate respondents and their supervisors. The determination of most/least useful subject areas in the graduate AFIT CAM curriculum involved the calculation of the median response for each survey question pertaining to the curriculum. For AFIT CAM graduates, Questions 31-61, 63, and 68 were utilized. For supervisors of AFIT CAM graduates, Questions 10-41 and 43 were utilized in the curriculum evaluation. After the median response for each question was calculated, the responses were ranked from highest to lowest for each population. Thus, rankings of subject areas in terms of perceived usefulness were accomplished for both AFIT CAM graduates and supervisors. After the two rankings were completed, the researchers

subjectively analyzed the results to determine if there was significant agreement or disagreement between the AFIT CAM graduates and their supervisors concerning the AFIT CAM curriculum.

Assumptions and Limitations

The researchers made several assumptions in this research project. These assumptions were divided into two categories: statistical assumptions and general assumptions. Both categories of assumptions were critical to the consistency of the research and are identified below.

Statistical Assumptions

1. The use of a seven-point Likert scale in the questionnaire resulted in ordinal level data.

2. The population distributions from which the samples were drawn were unknown. As a result, the use of nonparametric statistics was justified.

3. Statistical analysis of ordinal data was properly handled with nonparametric techniques.

4. The purposive sampling technique was a valid means of developing a sample for nonparametric testing.

General Assumptions

1. The research respondents provided honest responses and took a reasonable amount of time to consider each response to questions on the survey instrument (15:27).

2. The survey instruments were reliable attitude

measurement tools that were adequately validated.

3. The researchers' definition of usefulness was appropriate for this research study.

There were also several limitations identified for this research study. These limitations are identified below.

Limitations

1. The conclusions of this research study apply only to the two samples of respondents identified earlier in this chapter.

2. Measurement of perceptions and attitudes was qualitative in nature.

3. Responses to the open-ended questions were interpreted and analyzed by the researchers and conclusions were based on the researchers' subjective judgment (15:28).

Summary

Chapter 1 described the need for contracting education, defined the research problem, and presented Research Questions and supporting Research Hypotheses. Chapter 2 provided background and discussed the origins of Government procurement education, the availability of procurement education today, and the development of the AFIT CAM program from its inception to the present day. This chapter described the procedures used by the researchers to evaluate the usefulness of the graduate AFIT CAM program. These research procedures included a contingency table analysis, nonparametric statistical analysis, descriptive numerical tables, and the rank ordering of

most/least useful subject areas in the AFIT CAM program curriculum. Using the research methodology outlined in this chapter, the researchers proceeded to analyze the data in Chapter 4.

CHAPTER 4

DATA ANALYSIS

Introduction

The purpose of the Data Analysis chapter is to present and analyze survey data utilizing the research methodology formulated in Chapter 3. Included in this chapter are: 1) a survey response summary; 2) a contingency table analysis to validate the usefulness questions; and 3) analysis of all three research questions stated in Chapter 1. Analysis of the research questions consisted of nonparametric statistical tests, a demographic profile of graduate respondents, and a rank ordering of AFIT CAM curriculum courses. Finally, this chapter analyzed the open-ended survey questions concerning incorporation of Professional Continuing Education (PCE) courses in the AFIT CAM curriculum.

Survey Response Summary

The response rates for graduate and supervisor questionnaires (see Appendices A and B) compared favorably to those achieved by Crowder and Davidson (15:29), originators of the survey approach used in this research effort. A total of 105 graduate survey questionnaires were mailed, 102 male and 3 female; 77 graduates responded (73.3 percent), 75 male

and 2 female. A total of 78 supervisor questionnaires were mailed; 41 supervisors responded (52.6 percent). Table 4.1 summarizes the survey response rate percentages by class year.

TABLE 4.1

Response Percentage by Class Year

Class Year	Total Response	% Total Response	Target Class Population	% Response Within Each Class
1981	8	10.4	11	72.7
1980	9	11.1	11	81.8
1979B	8	10.4	10	80.0
1979A	7	9.1	8	87.5
1978B	6	7.8	7	85.7
1978A	5	6.5	7	71.4
1977B	5	6.5	7	71.4
1977A	3	3.9	7	42.8
1976B	5	6.5	8	62.5
1976A	5	6.5	7	71.4
1975B	7	9.1	9	77.7
1975A	3	3.9	4	75.0
1974B	6	7.8	9	66.6
Total	77	100.0	105	N/A

Crowder and Davidson achieved a 72.3 percent and 62.5 percent response rate for graduates and supervisors, respectively (15:29).

The response rate within each class for ten of the thirteen AFIT CAM respondent classes was greater than 70 percent (see Table 4.1). The percentage response rate within AFIT CAM respondent class 1979A was the highest, at 87.5

percent; AFIT CAM respondent class 1977A was lowest at 42.8 percent.

Parts I and II of all survey questionnaires (i.e., the Demographics and Perceptions sections) were completed by all respondents in their entirety. However, Part III of the survey instruments, Open-Ended Questions, received less than a 100 percent completion rate. AFIT CAM graduate completion rate for Part III of the questionnaire was 92.2 percent (71 of 77 questionnaires); supervisor completion rate for Part III of the questionnaire was 78.1 percent (32 of 41 questionnaires).

A particularly important aspect of supervisor responses was to ensure that supervisors were, in fact, familiar with subordinate job requirements and duties. Thus, supervisor respondents answering "No" to Question 2 of Part I in the supervisor questionnaire were of no use in the research and were eliminated from the study if encountered. All supervisor respondents, however, answered that they were familiar with subordinate job requirements and performance. As a result, no supervisor questionnaires were discarded due to supervisor lack of knowledge regarding subordinate job requirements.

Contingency Table Analysis

Two sets of contingency tables were utilized to: 1) ensure that respondent scores provided a valid measure of perceived usefulness of the AFIT CAM program; and 2) assess consistency among graduate and supervisor responses to the AFIT CAM program usefulness questions. The first set of contingency

tables, illustrated in Appendix C, Tables C-1 and C-2, show the results of graduate response to survey Questions 26-30 and 62, the AFIT CAM usefulness questions. Table C-1 compares graduates who did not agree (column 1 responses) with those graduates who agreed (column 2 responses) that the AFIT CAM program was useful. That is, column 1 (Table C-1) responses included graduates answering either "Disagree" or "Undecided" to graduate survey Questions 26-30 and 62. Column 2 (Table C-1) responses included only those graduates answering "Agree" to these same questions.

The null and alternate hypotheses tested were:

H_0: The answers to all usefulness questions are consistent (homogeneous) with each other in that the percentage responses for all of the usefulness questions are the same.

H_A: There exists inconsistency (non-homogeneity) in the percentage responses for at least two of the usefulness questions.

The test statistic was the Chi-Square table value for $\chi^2_{.05,5}$ or 11.0705. The decision rule was to reject H_0 if the calculated Chi-Square value was greater than 11.0705. The Appendix C, Table C-1, calculated Chi-Square value was 10.12207. Therefore, the researchers could not reject the null hypothesis at the 95 percent confidence level. The researchers concluded that there was insufficient evidence to support non-homogeneity of graduate responses to the battery of questions measuring AFIT CAM program usefulness.

Table C-2 (Appendix C) compares graduates who disagreed (column 1 responses) with those graduates that either agreed or were undecided (column 2 responses) regarding the AFIT CAM program usefulness. Column 1 (Table C-2) responses included only those graduates answering "Disagree" to graduate survey Questions 26-30 and 62. Column 2 (Table C-2) responses included graduates answering either "Agree" or "Undecided" to these same questions.

The null and alternate hypotheses, test statistic, and decision rule for evaluating Table C-2 data remained the same as those used for evaluating Table C-1 data. The Table C-2 calculated Chi-Square statistic was 9.71171, less than the test statistic, 11.0705. Therefore, the researchers again could not reject the null hypothesis at the 95 percent confidence level. The researchers concluded that there was insufficient evidence to support non-homogeneity of responses by graduates to the battery of questions measuring AFIT CAM program usefulness. The conclusion was the same whether "Undecided" graduate respondents were grouped with those graduates who "Agreed" or "Disagreed" that the AFIT CAM program was useful. In either case, there was insufficient evidence to reject the null hypothesis.

The second set of contingency tables, illustrated in Appendix C, Tables C-3 and C-4, assessed consistency among supervisor responses to the AFIT CAM program usefulness questions. Table C-3 compares supervisors of active duty military and civilian CAM graduates who agreed(column 1 response) with

those that either disagreed or were undecided (column 2 responses) as to whether the AFIT CAM program is useful. Column 1 responses included only those supervisors answering "Agree" to supervisor survey Questions 5-9 and 42, the AFIT CAM usefulness questions. Column 2 responses included supervisors who answered "Disagree" or "Undecided" to these same questions.

The null and alternate hypotheses, test statistic, and decision rule for evaluating the Table C-3 and C-4 data remained the same as those used for evaluating Table C-1 data. The Table C-3 calculated Chi-Square statistic was 1.74159, less than the test statistic, 11.0705. Therefore, the researchers could not reject the null hypothesis at the 95 percent level. The researchers concluded there was insufficient evidence to support non-homogeneity of supervisor responses to the battery of questions measuring AFIT CAM program usefulness.

Appendix C, Table C-4, compares supervisors who disagreed(column 1 responses) as to whether the AFIT CAM program is useful. Column 1 (Table C-4) responses included only those supervisors answering "Disagree" to supervisor survey Questions 5-9 and 42. Column 2 (Table C-4) responses included those supervisors answering either "Agree" or "Undecided" to these same questions.

The null and alternate hypotheses, test statistic, and decision rule used to evaluate Table C-4 data remained the same as those used for evaluating Table C-1 data. The Table C-4 calculated Chi-Square statistic was 2.03306, less than the test statistic, 11.0705. The researchers again could not

reject the null hypothesis at the 95 percent confidence level. The researchers concluded there was insufficient evidence to support non-homogeneity of responses by supervisors to the battery of survey questions measuring AFIT CAM program usefulness. In both Tables C-3 and C-4, the conclusion was the same whether "Undecided" supervisor respondents were grouped with those who "Agreed" or "Disagreed" that the AFIT CAM program was useful to graduates. In both cases, there was insufficient evidence to reject the null hypothesis. Overall, the responses to questions used in both graduate and supervisor questionnaires to measure AFIT CAM program usefulness were assumed to be statistically consistent measurements of the program's usefulness. There was insufficient evidence to conclude otherwise.

Perceptions

Research Question One

What are the perceptions of active duty Air Force military and civilian AFIT CAM graduates and their supervisors regarding the usefulness of a graduate AFIT CAM education in postgraduate assignments? Four research (null) hypotheses were used to answer Research Question One:

A. Research (Null) Hypothesis One: Active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful in postgraduate assignments.

   1. Statistical Test: Wilcoxon Signed-Ranks Test, $\alpha = .05$.

The statistically equivalent H_0 and H_A for Research Hypothesis One are:

H_0: The median graduate respondent's cumulative score $\leq$ 24.

H_A: The median graduate respondent's cumulative score > 24.

Since this was a one-tailed statistical test, the decision rule was to reject H_0 if one-half the calculated statistic (the two-tail probability) was less than the statistical level of significance chosen, $\alpha = .05$. The H_0 is not true if the calculated statistic (z-score) has a probability of occurring less than the specified alpha (α) level (33:268).

2. Results: Appendix C, Table C-5, illustrates the results of the Wilcoxon Signed-Ranks test for graduates. One-half the calculated two-tail probability was 0.00, less than the statistical level of significance chosen, $\alpha = .05$. Therefore, the researchers rejected the H_0 and were 95 percent confident that graduates found the AFIT CAM program useful.

B. Research (Null) Hypothesis Two: Supervisors of active duty Air Force military and civilian AFIT CAM graduates perceive the AFIT CAM program as not useful to their subordinates in postgraduate assignments.

1. Statistical Test: Wilcoxon Signed-Ranks Test, $\alpha = .05$. The statistically equivalent H_0 and H_A for Research Hypothesis Two were:

H_0: The median supervisor respondent's cumulative score is $\leq$ 24.

H_A: The median supervisor respondent's cumulative score > 24.

Since this was a one-tailed test, the decision rule was to reject H_0 if one-half the calculated statistic (the two-tail probability) was less than the statistical level of significance chosen, $\alpha = .05$.

2. Results: Appendix C, Table C-6, illustrates the results of the Wilcoxon Signed-Ranks Test for supervisors. One-half of the calculated statistic (the two-tail probability) was 0.000, less than the statistical level of significance chosen. Therefore, the researchers rejected the H_0 and were 95 percent confident that supervisors of active duty Air Force military and civilian CAM graduates consider the AFIT CAM program useful.

C. Research (Null) Hypothesis Three: There is no significant difference between active duty Air Force military and civilian AFIT CAM graduates' and their supervisors' perceptions of AFIT CAM program usefulness.

1. Statistical Test: Wilcoxon Rank Sum Test, $\alpha = .05$. The statistical equivalent H_0 and H_A for Research Hypothesis Three were:

H_0: The median graduate respondent's score equals the median supervisor's score.

H_A: The median graduate respondent's score does not equal the median supervisor's score.

Since this was a two-tailed test, the decision rule was to reject H_0 if the calculated statistic (two-

tailed probability) was less than the level of significance chosen, $\alpha = .05$.

2. Results: Appendix C, Table C-7, illustrates the results of the Wilcoxon Rank Sum Test for graduates and supervisors. The calculated two-tailed probability was .6116, greater than the level of statistical significance chosen, $\alpha = .05$. Therefore, the researchers could not reject the null hypothesis. There was insufficient evidence to conclude that a significant difference in perceptions exists between graduates and supervisors concerning usefulness of the AFIT CAM program.

D. Research (Null) Hypothesis Four: Active duty Air Force military and civilian graduates' perceptions of AFIT CAM program usefulness do not change over time.

1. Statistical Test: Spearman's Nonparametric Test for Rank Correlation, $\alpha = .05$. This test was conducted to determine if correlation existed between a graduate's cumulative score and length of time since graduation. The statistically equivalent H_0 and H_A for Research Hypothesis Four were:

H_0: Graduate median responses of AFIT CAM program usefulness do not change over time (no correlation).

H_A: Graduate median responses of AFIT CAM program usefulness do change over time (correlation).

The decision rule was to reject H_0 if the calculated test statistic (the significance of α) was less than

the standard chosen, $\alpha = .05$.

2. Results: Appendix C, Table C-8, illustrates the results of the Spearman Nonparametric Test for Rank Correlation for graduates. The calculated significance was .362, greater than the statistical standard chosen, $\alpha = .05$. Therefore, the researchers could not reject the H_0. There was insufficient evidence to reject the notion that active duty Air Force military and civilian graduates' perceptions of AFIT CAM program usefulness did not change over time.

Graduate survey Questions 64, 65, and 66 were also used as a more informal, or non-statistical means to answer Research Hypothesis Four. In analyzing Question 64, the researchers found that six of thirteen graduate CAM classes mildly disagreed as to whether the AFIT CAM program was of more value in current assignments than it would be in future assignments. The median response was three, or "Slightly Disagree." The remaining seven classes responded with a median score of four, or "Undecided." The combined median response by all graduate respondents to Question 64 was also four, or "Undecided."

Question 65 asked graduates whether their AFIT CAM education would be of more value in future assignments than current assignments. Eight of the thirteen classes responded with a median score of four, or "Undecided." One class responded with a score of three,

or "Slightly Disagree." Finally, four classes indicated agreement with a median response of five and one-half, between "Slightly Agree" and "Agree." The combined median response of all graduate AFIT CAM classes to Question 65 was four, or "Undecided."

In responding to Question 66, graduate respondents indicated whether or not their AFIT CAM education would increase in value over time. One class perceived that no increase in value would occur, responding with a median response of three and one-half, between "Slightly Disagree" and "Undecided." Four classes responded with a median response of four, "Undecided." Finally, the remaining eight classes believed that the value of their AFIT CAM education would increase over time with a median response of five, or "Slightly Agree." The combined median response from all graduate classes to Question 66 was five, or "Slightly Agree."

A summary of all median responses to Questions 64, 65 and 66 is provided in Table 4.2. As evidenced in this table, no obvious trend was detected in the responses to indicate a change in graduate perceptions of AFIT CAM program usefulness over time. There were no significant increases or decreases in the graduate respondent answers to Questions 64, 65 and 66 to suggest a trend over time. This conclusion, however, further supports the statistical conclusion reached

in answering Research Hypothesis Four. That is, there is insufficient evidence to reject the null hypothesis that graduate perceptions of AFIT CAM program usefulness do not change over time.

TABLE 4.2

Median Response by Class Year
to Questions 64, 65, and 66

Class	Median Response to Question:		
	64	65	66
74B	3.5	4	5.5
75A	4	4	5
75B	4	4	5
76A	3	5	5
76B	4	4	6
77A	4	3	4
77B	3	4	5
78A	3	5	6
78B	4	4	4
79A	3	6	4
79B	4	4	3.5
80	4	4	5
81	2	6	4
Overall Score	4	4	5

Demographics

Research Question Two

What is the demographic profile of active duty Air Force military and civilian AFIT CAM graduates?

The following tables and charts describe the characteristics of the two survey respondent groups, the AFIT CAM

graduates and their supervisors. Inferences concerning the entire population of active duty Air Force military and civilian graduates of the AFIT CAM program are neither implied nor attempted. Any attempt to do so would be invalid as the actual demographic composition of nonrespondents, as well as those purposely excluded, was not known nor available.

Table 4.3 illustrates military and civilian AFIT CAM graduate respondents by age group. A majority (67.5 percent) of AFIT CAM graduate respondents are in the 31-40 year age group. A plurality (36.5 percent) of graduate respondents, however, are in the 36-40 year age group.

TABLE 4.3

AFIT CAM Graduate Respondents By Age Group

Age	Military	%	Civilian	%
20-25	0	0	0	0
26-30	16	21.6	0	0
31-35	23	31.1	2	66.7
36-40	27	36.5	0	0
41-45	8	10.8	0	0
46-50	0	0	1	33.3
Over 50	0	0	0	0
Total	74	100.0	3	100.0

Table 4.4 lists active duty Air Force military and civilian AFIT CAM graduate respondents by rank/grade both at graduation and as of the date of the research surveys, July 1982. A majority (81.8 percent) of AFIT CAM graduate military

TABLE 4.4

AFIT CAM Graduate Respondents by Graduation Rank/Grade and Present Rank/Grade

Class	Graduation Rank/Grade						Present Rank/Grade				
	Military				Civilian		Military				Civilian
	02	03	04	05	GS9	GS12	03	04	05	06	GS12
81		7	1				7	1			
80	1	5	2		1		6	2			1
79B		6	1			1	4	3			1
79A		6	1				3	3	1		
78B		5				1	5				1
78A		5					4	1			
77B		3	2				1	2	2		
77A		3						3			
76B		5					2	3			
76A		5					1	3	1		
75B	1	4	1	1			1	4	1	1	
75A		3						2	1		
74B		6						4	2		
Total	2	63	8	1	1	2	34	31	8	1	3
%	2.6	81.8	10.4	1.3	1.3	2.6	44.2	40.3	10.4	1.3	3.9

respondents were Air Force captains (0-3) at graduation (see Table 4.4). A plurality (44.2 percent) of graduate military respondents currently remain at the rank of Air Force captain (0-3). A majority (66.7 percent) of civilian AFIT CAM respondents were in the GS-12 grade at graduation. All civilian graduate respondents are currently at the rank of GS-12.

Tables describing the current Air Force Specialty Code (AFSC) of military respondents and Job Series for civilian respondents were inconclusive due to military graduates apparently misinterpreting Questions 11 and 12 of the Demographic

section in the graduate questionnaire. In Question 11, graduates were asked to categorize their present AFSC/Job Series which included the 65XX (military) and 1100/1200 (civilian) contracting related career fields. Question 12 was designed to discriminate among the different 65XX or 1100/1200 career designations. In Question 11, 53 of 74 military respondents categorized their current AFSC as 65XX, while all 3 civilian respondents categorized their current Job Series as 1100/1200. In Question 12, however, 60 military respondents circled specific categories with 65XX specialties. The researchers concluded that seven military respondents answered Question 12 inconsistently with Question 11. Tables 4.5 and 4.6 illustrate graduate respondent answers when asked current military AFSC/civilian Job Series and specific 65XX/1100/1200 specialty, if assigned in the contracting field, respectively.

TABLE 4.5

Current AFIT CAM Graduate Respondent AFSC/Job Series

AFSC/Job Series	Number	%
65XX	53	68.8
27XX	3	3.9
66XX	1	1.3
Civilian (1100/1200)	3	3.9
Other	17	22.1
Total	77	100.0

A recount of questionnaires verified the previous reasoning. Table 4.7 lists the answers given for Questions

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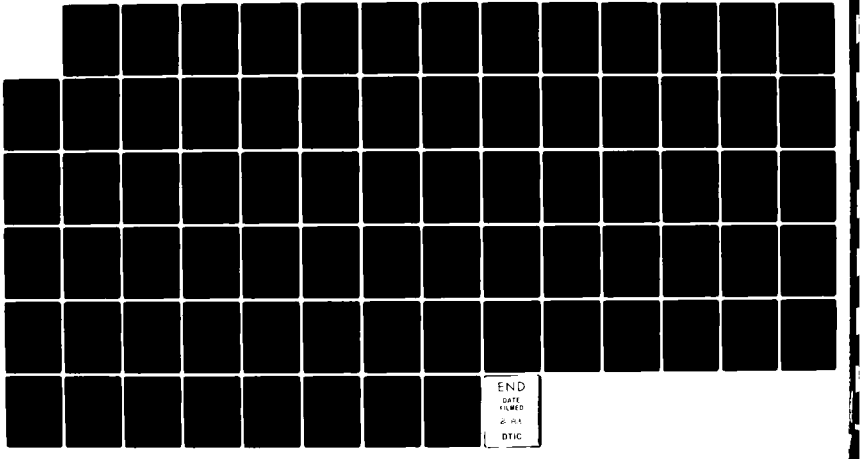


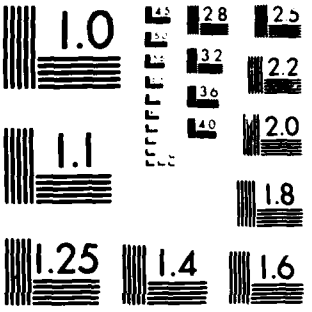


TABLE 4.6

AFIT CAM Graduate Respondents by Specific 65XX AFSC/Job Series

AFSC/Job Series	Number	%
6534	19	24.7
6531	3	3.9
6524	5	6.5
6521	1	1.3
6516	20	26.0
6511	10	13.0
6596	2	2.6
Civilian (1100/1200)	3	3.9
N/A	14	18.2
Total	77	100.0

11 and 12 by class year for the seven military respondents who misinterpreted these two questions.

TABLE 4.7

Seven Inconsistent Graduate Responses to Questions 11 and 12

Class	Question 11	Question 12
81	27XX	6534
78A	Other	6534
77B	Other	6516
76A	Other	6516
76A	Other	6534
75A	Other	6524
74B	27XX	6516

The researchers interpreted these seven inconsistent responses to mean that the seven individuals, all military, are currently

assigned to positions not characterized by a 65XX AFSC; however, the researchers concluded that the seven graduates still maintain a 65XX AFSC in their official military personnel records. Therefore, the researchers considered Question 11 graduate survey responses in Table 4.5 to be accurate. Table 4.7 resolves the discrepancy between Tables 4.5 and 4.6.

A majority (72.7 percent) of AFIT CAM graduate respondents are currently assigned in the Contracting/Manufacturing career field (i.e., 65XX AFSC or 1100/1200 series career designations for civilians)(see Table 4.5). A plurality (28.6 percent) of graduate respondents identified themselves as either Principal Contracting Officers or Contracting Staff (see Tables 4.8 and 4.9). These two categories of graduates were closely followed by graduate respondents classifying their job in either Systems Contract Administration (12.9 percent) or Rated (12.9 percent) duties.

TABLE 4.8

Graduate Respondent Current Job Description

Job Description	Number	%
Contract Negotiator	7	9.1
Contract Specialist	1	1.3
Principal Contracting Officer	11	14.3
Administrative Contracting Officer	4	5.2
Manufacturing/Production	6	7.8
Other	48	62.3
Total	77	100.0

In Table 4.9, the researchers classified graduate respondent job descriptions within the Table 4.8 "Other"

category into seven broad areas.

TABLE 4.9

Graduate Respondent Job Descriptions
Within "Other" Category

Job	Number	%
Contracting Staff	11	14.3
Systems Contract Buyer	4	5.2
Systems Contract Administration	10	12.9
Base Contracting	3	4.0
Production/Manufacturing/QA	4	5.2
Rated	10	12.9
Air University	6	7.8
Total	48	62.3

Sixty-one AFIT CAM graduate respondents currently hold contracting/manufacturing assignments. This number includes graduate respondents found in the first five categories of both Tables 4.8 (29 graduate respondents) and 4.9 (32 graduate respondents). Sixteen graduate respondents are currently assigned to either Rated (10 graduate respondents) or Air University (6 graduate respondents) duties (see Table 4.9). Among the 61 AFIT CAM graduate respondents currently holding contracting/manufacturing assignments, a majority (50.8 percent) have held their job for one year or less (see Table 4.10). Seventy-eight percent of AFIT CAM graduate respondents have held their present contracting/manufacturing job less than two years. Table 4.10 displays how long the 61 graduate respondents currently holding contracting jobs have held their present job.

Table 4.11 illustrates the number of people supervised

TABLE 4.10

Job Tenure of Graduate Respondents
Currently Holding Contracting Jobs

Time	Number	%
1 year or less	31	50.8
Over 1 year but less than 2 yrs	17	28.0
Over 2 years but less than 3 yrs	11	18.0
3 years or over	2	3.2
Total	61	100.0

by AFIT CAM graduates currently holding contracting related jobs. Among the AFIT CAM graduate respondents currently holding contracting/manufacturing assignments, a majority (62.3 percent) supervise five or less people (see Table 4.11). However, a sizeable plurality (40.9 percent) of AFIT CAM graduates do not supervise any people.

TABLE 4.11

Number of People Supervised by AFIT CAM Graduates
Currently Holding Contracting Related Jobs

No. of People Supervised	Respondents	%
0	25	40.9
1-5	13	21.4
6-10	8	13.2
11-15	6	9.8
16-20	3	4.9
Over 20	6	9.8
Total	61	100.0

Tables 4.12 and 4.13 display assignments of active duty AFIT CAM graduate respondents by Major Command or other designation: 1) prior to entering AFIT; 2) immediately following

AFIT; and 3) current assignment. A majority (74.1 percent) of AFIT CAM graduate respondents were assigned to four Air Force Major Commands immediately prior to entering AFIT CAM: the Strategic Air Command (SAC), 23.4 percent; Air Force Systems Command (AFSC), 20.8 percent; Military Airlift Command (MAC), 15.6 percent; and Air Force Logistics Command (AFLC), 14.6 percent (see Tables 4.12 and 4.13). A majority (81.8 percent) were assigned to either AFSC (61.0 percent) or AFLC (20.8 percent) following graduation. A plurality (48.1 percent) of graduate respondents are currently assigned to either Air Force Systems Command (AFSC), 35.1 percent, or Air Force Logistics Command (AFLC), 13.0 percent.

TABLE 4.12

Graduate Respondent Assignments By Major Command or Other Designation (by Number)

Assignment	Prior to AFIT	Following AFIT	Currently Assigned
AFSC	16	47	27
AFLC	11	16	10
AFCS	3	3	3
ADC	1	1	0
ATC	3	0	4
AU	0	0	2
DLA	1	3	6
HQ USAF	3	0	1
MAC	12	2	6
PACAF	2	0	0
SAC	18	2	4
TAC	3	0	3
USAFE	1	3	5
Other	3	0	6
Total	77	77	77

Within the "Other" category of Table 4.12, two of the nine graduate respondents failed to completely specify their

TABLE 4.13

Graduate Respondent Assignments by Major Command or Other Designation (by Percentage)

Assignment	Prior to AFIT	Following AFIT	Currently Assigned
AFSC	20.8	61.0	35.1
AFLC	14.3	20.8	13.0
AFCS	3.9	3.9	3.9
ADC	1.3	1.3	0
ATC	3.9	0	5.2
AU	0	0	2.6
DLA	1.3	3.9	7.8
HQ USAF	3.9	0	1.3
MAC	15.6	2.6	7.8
PACAF	2.6	0	0
SAC	23.4	2.6	5.2
TAC	3.9	0	3.9
USAFE	1.3	3.9	6.5
Other	3.9	0	7.8
Total	100.0	100.0	100.0

assignment prior to entering AFIT. The remaining seven respondents categorized assignments as listed in Table 4.14.

TABLE 4.14

Seven Graduate Respondent Job Descriptions/ "Other" Category (by Number)

Assignment	Prior to AFIT	Following AFIT	Currently Assigned
Air Force Courier Service	1	0	0
Special Assignment, Office of Secretary of Defense	0	0	1
AFELM	0	0	1
AFTEC	0	0	1
CINCLINT	0	0	1
NATO	0	0	2
Total	1	0	6

Within the Major Command or "Other" assignment designations, graduate respondents categorized the current level of their assignments as listed in Table 4.15. Although a plurality (22.1 percent) of graduate respondents are presently assigned at the Numbered Air Force level, the bulk of graduate respondents are assigned equitably throughout all levels of Air Force command (see Table 4.15)

TABLE 4.15

Graduate Respondent Level of Assignment

Assignment	Number	%
Squadron or below	11	14.3
Group	4	5.2
Wing	10	13.0
Air Division	6	7.8
NAF	17	22.1
MAJCOM	15	19.5
HQ USAF	1	1.3
Special Assignment	13	16.8
Total	77	100.0

Table 4.16 illustrates the number of active duty military/civilian AFIT graduate respondents having contracting experience prior to entering the AFIT CAM program. The majority of AFIT CAM respondents had no contracting experience prior to entering the AFIT CAM program.

TABLE 4.16

Graduate Contracting/Manufacturing Experience Prior to Entering the AFIT CAM Program

	Number	%
Experience	28	36.4
No Experience	49	63.6
Total	77	100.0

Table 4.17 illustrates attendance at Lowry AFB/Ft. Belvoir by AFIT CAM respondents having pre-AFIT CAM contracting experience. Of those 28 AFIT CAM graduate respondents with contracting experience prior to entering AFIT CAM (see Table 4.16), a vast majority (82.1 percent) attended a basic technical contracting course at Lowry AFB or Ft. Belvoir either prior to or following their AFIT CAM assignment (see Table 4.17)

TABLE 4.17

Respondents With Pre-AFIT CAM Contracting Experience: Attendance at Lowry AFB/Ft. Belvoir

Attendance	Number	%
Before AFIT CAM	21	75.0
After AFIT CAM	2	7.1
Never	5	17.9
Total	28	100.0

Table 4.18 displays attendance at Lowry AFB/Ft. Belvoir for graduate respondents without pre-AFIT CAM contracting experience. Of those 49 AFIT CAM graduate respondents without previous contracting experience (see Table 4.16), 59.2 percent attended a technical contracting course at Lowry AFB or Ft. Belvoir either prior to or following their AFIT CAM assignment (see Table 4.18).

A majority (75.3 percent) of graduate respondent job assignments since graduation from the AFIT CAM program have been in a contracting-related field. However, a sizeable plurality (49.4 percent) of graduate respondents have held only one contracting-related assignment. Tables 4.19 and

4.20 illustrate these points.

TABLE 4.18

Respondents Without Pre-AFIT CAM Contracting Experience: Attendance at Lowry AFB/Ft. Belvoir

Attendance	Number	%
Before AFIT CAM	6	12.3
After AFIT CAM	23	46.9
Never	20	40.8
Total	49	100.0

TABLE 4.19

Graduate Respondent Contracting/Non-Contracting Assignments Since AFIT CAM Graduation

Assignment	Number	%
Contracting Related	58	75.3
Non-Contracting Related	19	24.7
Total	77	100.0

TABLE 4.20

Number of Graduate Respondent Contracting-Related Assignments Since AFIT CAM Graduation

Contracting-Related Jobs Held	Number	%
1	38	49.4
2	24	31.2
3	6	7.8
4 or more	8	10.4
None	1	1.3
Total	77	100.0

Table 4.21 highlights current graduate respondent contracting/manufacturing experience levels. The majority of AFIT CAM graduate respondents (59.7 percent) have less than five years of contracting/manufacturing experience (see Table 4.21). However, a sizeable plurality (44.2 percent)

have three or less years of contracting/manufacturing experience.

TABLE 4.21

Graduate Respondent Contracting/Manufacturing Experience Levels

Experience	Number	%
3 years or less	34	44.2
Over 3 yrs but less than 5	12	15.5
Over 5 yrs but less than 8	14	18.2
Over 8 yrs but less than 11	10	13.0
Over 11 yrs	7	9.1
Total	77	100.0

The researchers believed that the observations drawn from Tables 4.10, 4.11, 4.16, 4.20, and 4.21 resulted directly from the higher survey response rate obtained from recent AFIT CAM classes (see Table 4.1). The reader is cautioned against making erroneous observations concerning the demographic profile of the entire AFIT CAM graduate population based on these five tables.

Table 4.22 highlights the levels of contracting assignments (base, central, systems, or a combination of these) for AFIT CAM graduate respondents. A sizeable plurality (46.7 percent) of graduate respondent assignments were at the major systems level of acquisitions (see Table 4.22).

Table 4.23 displays current graduate respondent educational levels. Only 27.3 percent of AFIT CAM graduate respondents have pursued postgraduate education above the master's degree level (see Table 4.23). No graduate respondents from the survey have earned a doctorate degree. It should be

TABLE 4.22

Graduate Respondent Assignments By Level of Acquisition

Level of Acquisition	Number	%
Base	5	6.5
Central	8	10.4
Systems	36	46.7
All the above	6	7.8
Base and Central	4	5.2
Base and Systems	4	5.2
Central and Systems	14	18.2
Total	77	100.0

noted, however, that at least one AFIT CAM graduate had a doctorate degree at the time of this research effort. This AFIT CAM graduate, who is a member of the current AFIT CAM faculty, was purposely excluded from the survey target population as discussed in Chapter 3 (Research Methodology).

TABLE 4.23

Current Graduate Respondent Educational Levels

Degree	Number	%
Masters	56	72.7
Masters plus additional graduate work	10	13.0
More than one Masters	11	14.3
Doctorate	0	0
Total	77	100.0

Table 4.24 shows the number of contracting-related AFIT Professional Continuing Education (PCE) courses attended by graduate respondents since graduating from the AFIT CAM program. A majority (53.3 percent) of AFIT CAM graduate respondents attended one or more contracting-related PCE courses following graduation from the AFIT CAM program (see Table 4.24).

TABLE 4.24

AFIT PCE Courses Attended By Graduate Respondents Following AFIT CAM Program

PCE Courses Attended	Number	%
0	36	46.7
1	13	16.9
2	9	11.7
3	6	7.8
4 or more	13	16.9
Total	77	100.0

Finally, a majority of AFIT CAM respondents have yet to achieve other forms of professional contracting accreditation. Only 9 of 77 (11.7 percent) of graduate respondents have published at least one article in a professional contracting or logistics journal since graduation from the AFIT CAM program. The journals cited by respondents included the Air Force Academy Journal, Air Force Journal of Logistics, Defense Systems Management Journal, and National Contract Management Association Journal. Additionally, 15 of 77 respondents (19.5 percent) have obtained a professional contracting designation (e.g., the National Contract Management Association's Certified Professional Contract Manager designation) since graduation from the AFIT CAM program.

Curriculum Ranking

Research Question Three

What are the most/least useful subject areas in the AFIT CAM curriculum as perceived by active duty Air Force military and civilian graduates and their supervisors?

A battery of questions were used on both the graduate and supervisor questionnaires to determine the most/least useful subject areas taught in the AFIT CAM curriculum. For graduates , survey Questions 31-61, 63, and 68 were analyzed; for supervisors, survey Questions 10-41 and 43 were analyzed. The median response was calculated for each question from both groups of respondents. The resulting median scores were then ranked from most to least useful. Subject areas with tied median scores were ranked equally. Tables 4.25 and 4.26 summarize the question number, subject area, overall median response, and ranking of courses from most to least useful for graduates and supervisors, respectively. For each table, the smaller the ranking number, the more useful the course. Courses with equal rank were listed alphabetically. Thus, there is no significance to the ordering of the courses with equal median scores and ranking as listed in Tables 4.25 and 4.26.

The following observations were made based on the data presented in Tables 4.25 and 4.26. In general, AFIT CAM graduate and supervisor respondents found the AFIT CAM curriculum useful in postgraduate assignments. Graduate respondents found fourteen of the eighteen AFIT CAM curriculum courses (77.7 percent) useful (see Table 4.25). Supervisor respondents found sixteen of the eighteen AFIT CAM curriculum courses (83.3 percent) useful. The researchers categorized courses with median scores greater than four, or "Undecided," as useful.

AFIT CAM graduate respondents ranked the five contracting specific courses among the most useful courses in the AFIT

TABLE 4.25

Graduate Respondent Course Rankings

Question #	Subject Area	Median	Rank
55,56,59	Contract Management Theory	7.0	1
53,54	Contract Law	6.5	2
50	Contracting & Acquis. Mgt.	6.0	3
47,51,52,60	Cost and Price Theory	6.0	3
33,44	Organizational Behavior	6.0	3
57,58,61	Seminar in Acquisition Mgt.	6.0	3
32	Accounting (review term)	5.0	4
36	Distribution Management	5.0	4
48	Economic Analysis & Public Policy	5.0	4
35	Federal Financial Mgt.	5.0	4
38	International Logistics Overview	5.0	4
31	Quantitative Methods (review term)	5.0	4
46,68	Research & Technical Writing	5.0	4
63	Thesis		
49	Quantitative Decision Making	4.0	5
34,41	Statistics I & II	4.0	5
42,43	Intro. to Computer (review term)	3.5	6
37,39,40	Production & Maint. Mgt.	3.0	7

CAM curriculum (see Table 4.25). Graduate respondents ranked Contract Management Theory as the most useful course among all courses in the AFIT CAM curriculum. Graduates ranked Contract Law as the second most useful course. Graduate respondents ranked the courses Contracting and Acquisition Management, Cost and Price Theory, and Seminar in Acquisition Management equally as the third most useful courses in the AFIT CAM curriculum. Graduates also ranked one non-contracting specific

TABLE 4.26

Supervisor Respondent Course Rankings

Question #	Subject Area	Median	Rank
30	Contracting & Acquis. Mgt.	7.00	1
35,36,39	Contract Management Theory	7.00	1
37,38,41	Seminar in Acquisition Mgt.	7.00	1
33,34	Contract Law	6.50	2
13,24	Organizational Behavior	6.50	2
27,31,32,40	Cost & Price Theory	6.00	3
11	Quantitative Methods (review term)	6.00	3
26,43	Research & Technical Writing	6.00	3
10	Accounting (review term)	5.00	4
28	Economic Analysis & Public Policy	5.00	4
15	Federal Financial Mgt.	5.00	4
18	International Logistics Overview	5.00	4
17,19,20	Production & Maint. Mgt.	5.00	4
12	Quantitative Decision Making	5.00	4
14,21	Statistics I & II	5.00	4
29	Thesis	5.00	4
22,23	Intro. to Computer (review term)	3.50	5
16	Distribution Management	3.00	6

course, Organizational Behavior, equally with those courses tied for third most useful.

Supervisor respondents ranked the five contracting specific courses among the most useful courses in the AFIT CAM curriculum (see Table 4.26). Supervisor respondents agreed with graduate respondents in ranking Contract Management Theory among the most useful courses. Supervisors,

however, ranked two additional courses, Contracting and Acquisition Management and Seminar in Acquisition Management, equally as the most useful courses. Supervisor respondents also agreed with graduate respondents in ranking Contract Law among the second most useful courses. Supervisors also ranked Organizational Behavior as the second most useful course. Supervisor respondents ranked Cost and Price Theory equally with Quantitative Methods and Research and Technical Writing as the third most useful courses.

All AFIT CAM curriculum courses ranked as least useful by graduate and supervisor respondents were non-contracting specific courses. AFIT CAM graduate respondents ranked Production and Maintenance Management as the least useful course among all courses in the AFIT CAM curriculum. Supervisors disagreed, ranking Distribution Management as the least useful course. However, both graduate and supervisor respondents ranked the Introduction to Computer course next to last in terms of usefulness.

It should be noted that inconsistency existed in AFIT CAM graduate and supervisor respondent rankings for the least useful courses (see Tables 4.25 and 4.26). Whereas graduate respondents ranked Production and Maintenance Management as the least useful AFIT CAM curriculum course, supervisor respondents found this course useful. When supervisor respondents ranked Distribution Management as the least useful course in the AFIT CAM curriculum, graduate respondents found this course useful.

Open-Ended Questions

Part III of both graduate and supervisor questionnaires (see Appendices A and B) contained questions which afforded respondents an opportunity to identify those topics or subject areas which warranted increased emphasis in the AFIT CAM curriculum. Graduates were also asked to list topics or subject areas which warranted decreased emphasis in the AFIT CAM curriculum. Supervisors were asked to identify those areas in which the AFIT CAM graduate subordinates were strongest and weakest. Questions 69 and 70 for graduates (see Appendix A) and Questions 45 and 46 for supervisors (see Appendix B) were the applicable open-ended response questions for each group.

In Tables 4.27-4.30, topics are listed in alphabetical order. No attempt was made to determine relative importance or ranking among topics. Table 4.27 displays topics or subject areas needing increased emphasis in the AFIT CAM curriculum as suggested by graduates. These topics are categorized into two broad groups: contracting and non-contracting related topics. Table 4.28 displays subject areas/topics requiring less emphasis as viewed by graduate respondents. Table 4.29 displays subject areas/topics requiring increased emphasis as viewed by supervisor respondents.

In Table 4.30, supervisor respondents identified the primary strengths and weaknesses concerning their AFIT CAM subordinates.

TABLE 4.27

Graduate Respondents: AFIT CAM Subject Areas Needing Increased Emphasis

Contracting Related	Non-Contracting Related
Acquisition Strategies	Communication Skills
Contract Administration	a. Speech
Contract Files	b. Writing
Contract Types	Economics
Contracting Process	Federal Financial Management
Contractor Financing/ Marketing Management	International Logistics
Contractor Motivation	Use of Computer Output
Cost/Price/Risk Analysis	
Defense Acquisition Regulation Clauses	
Defense Industrial Base	
Determination & Findings	
Interface with SPOs a. Configuration Mgt. b. Integrated Logistics Support	
Manufacturing/Quality Assurance	
Negotiations	
Small Business Contracting	
Software Acquisition	
SPO/AFPRO Interface	
Systems Acquisition Process	
Systems Contracting vs. Central and Base	

TABLE 4.28

Graduate Respondents: AFIT CAM Subject Areas Needing Less Emphasis

Contracting Related	Non-Contracting Related
None	Distribution Management
	Production & Maintenance Mgt.
	Quantitative Decision Making
	Statistics I & II
	Thesis/Research Efforts

TABLE 4.29

Supervisor Respondents: AFIT CAM Subject Areas Needing Increased Emphasis

Contracting Related	Non-Contracting Related
Business Strategies	Accounting
Commercial Buying	Communication Skills a. Speech b. Writing
Contract Law	
Contract Management	Federal Financial Management a. Program Objective Memorandum b. Budget Estimate Submittal
Contract Planning	
Cost & Price Analysis	
Interface within SPOs	International Logistics
Logistics Command vs Systems Command Contracting	Quantitative Decision Techniques
Manufacturing/Quality Assurance	Supervision
Negotiations	
Program Management	
Source Selection Process	

In general, subject areas identified by graduate respondents requiring increased emphasis (see Table 4.27) are adequately covered in the current AFIT CAM curriculum. However, two contracting-related subject areas, Software

TABLE 4.30

Supervisor Respondents: AFIT CAM Graduate Subordinate Strength/Weakness Areas

Strengths	Weaknesses
Acquisition Process	Communication Skills a. Speech b. Writing
Contract Law	Federal Financial Mgt.
Manufacturing/Quality Assurance	Incentive Arrangements
Problem/Risk Analysis	Negotiation
Quantitative Decision Making	Use of Computer Output
Regulations (DAR)	
Research	

Acquisition and Small Business Contracting, are not sufficiently covered within the existing AFIT CAM curriculum. Graduate respondents also listed one non-contracting related subject area, Speech, which is not adequately covered within the existing AFIT CAM curriculum. Although one speech course, Speech for Military Managers, is available to AFIT CAM students, this course is an elective and not a required course within the existing AFIT CAM curriculum.

In general, subject areas listed by supervisor respondents requiring increased emphasis (see Table 4.29) are adequately covered by the current AFIT CAM curriculum. Like the graduate respondents, however, supervisors identified Speech as a subject area requiring increased emphasis. Thus, there was agreement between graduate and supervisor respondents concerning the importance of speaking ability in on-the-job performance; however, Speech is not a required course within

the existing AFIT CAM curriculum.

AFIT CAM graduate respondents did not identify any subject areas covered by the five specific contracting courses as requiring less emphasis in future course offerings (see Table 4.28). However, graduate respondents identified five non-contracting subject areas requiring less emphasis: Distribution Management, Production and Maintenance Management, Quantitative Decision Making, Statistics I and II, and Thesis/Research Efforts. With the exception of Distribution Management and Thesis/Research Efforts, these subject areas correspond with three of the four least useful graduate course rankings (see Table 4.25). Supervisors were not asked to identify subject areas requiring less emphasis in future AFIT CAM curriculum offerings.

Supervisor respondents found AFIT CAM subordinates weak in four areas (see Table 4.30) which, with one exception, corresponded with subject areas they identified as requiring increased emphasis in future AFIT CAM curriculum offerings (see Table 4.29): Communication Skills (Speech and Writing), Negotiation, Federal Financial Management, and Incentive Arrangements. Supervisors also cited AFIT CAM graduate weaknesses in the Use of Computer Output (see Table 4.30). However, supervisors did not previously cite computer output utilization as requiring increased emphasis in the AFIT CAM curriculum (see Table 4.29).

The survey instrument questions for Research Question Three were written in terms of usefulness to the respondent's

job. As such, a low usefulness ranking of a course or suggested de-emphasis of a particular subject area should not be interpreted that the course or subject area is inappropriate for the entire School of Systems and Logistics. A better interpretation would be that the appropriateness of the particular course/subject area for the AFIT CAM curriculum should be reassessed.

Professional Continuing Education (PCE) and AFIT CAM

Question 67 on the graduate survey (see Appendix A) and Question 44 on the supervisor survey (see Appendix B) measured whether respondents believed that incorporation of contracting-related (PCE) courses would improve the overall usefulness of the AFIT CAM program. The median response of graduate respondents was five, or "Slightly Agree." The median response of supervisor respondents was six, or "Agree." Tables 4.31 and 4.32 illustrate individual responses from graduate and supervisor respondents to these two questions.

TABLE 4.31

Graduate Response to Incorporating PCE Into AFIT CAM Curriculum

Response	Number	%
Strongly Disagree	1	1.3
Disagree	7	9.0
Slightly Disagree	6	7.8
Undecided	18	23.4
Slightly Agree	15	19.5
Agree	18	23.4
Strongly Agree	12	15.6
Total	77	100.0

TABLE 4.32

Supervisor Response to Incorporating PCE Into AFIT CAM Curriculum

Response	Number	%
Strongly Disagree	0	0
Disagree	1	2.4
Slightly Disagree	0	0
Undecided	7	17.1
Slightly Agree	4	9.8
Agree	17	41.5
Strongly Agree	12	29.2
Total	41	100.0

As evidenced from Tables 4.31 and 4.32, both graduate (58.5 percent) and supervisor (80.5 percent) respondents indicated some form of agreement (i.e., Strongly Agree, Agree, or Slightly Agree) to the incorporation of contracting-related PCE courses into the AFIT CAM curriculum to improve the overall usefulness of the AFIT CAM program.

Summary

The data analysis chapter revealed that 73.3 percent of the graduates and 52.6 percent of the supervisors surveyed responded to the questionnaires. Contingency table analysis validated all of the usefulness questions. A series of non-parametric statistical tests, numerical tables, and usefulness ranking of the AFIT CAM curriculum were utilized to evaluate all three research questions formulated in Chapter 1. Finally, the researchers were able to identify key observations from responses to the open-ended questions. In the final chapter that follows, the researchers provide several substantive conclusions and recommendations.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this chapter is to present the results of the authors' research effort. First, the researchers will restate the three basic research questions identified in Chapter 1 and summarize the research methodology used in the study. Second, the researchers present several substantive conclusions drawn from the research project. Finally, research recommendations relating to the AFIT CAM program and recommendations for future follow-on research efforts are identified.

Research Design Summary

The three research questions described in Chapter 1 provided the overall framework for this research effort:

1. What are the perceptions of active duty Air Force military and civilian AFIT CAM graduates and their supervisors regarding the usefulness of a graduate AFIT CAM education in postgraduate assignments?
2. What is the demographic profile of active duty Air Force military and civilian AFIT CAM graduates?
3. What are the most/least useful subject areas in the AFIT CAM curriculum as perceived by active duty

Air Force military and civilian graduates and their supervisors?

Data were collected by means of questionnaires mailed to a target population of 105 active duty Air Force military and civilian AFIT CAM graduates and 78 of their immediate supervisors. Valid responses were obtained from 77 (73.3 percent) of the graduates and 41 (52.6 percent) of the supervisors.

The researchers analyzed the data in accordance with the research methodology outlined in Chapter 3. The key points of the authors' research methodology included:

1. Contingency table analysis to validate usefulness Questions 26-30 and 62 in the graduate survey (see Appendix A) and Questions 5-9 and 42 in the supervisor survey (see Appendix B);
2. Nonparametric statistical tests used to answer Research Question One which consisted of:
    a. The Wilcoxon Sign-Rank Test performed on graduate median responses to Questions 26-30 and 62.
    b. The Wilcoxon Sign-Rank Test performed on supervisor median responses to Questions 5-9 and 42.
    c. The Wilcoxon Rank Sum Test performed using graduate and supervisor median responses to Questions 26-30 and 62 (graduates) and Questions 5-9 and 42 (supervisors).
    d. The Spearman Nonparametric Test for Rank Correlation performed with graduate respondent cumulative scores to Questions 26-30 and 62 against

length of time since graduation.

3. Nineteen numerical tables that presented a demographic profile of AFIT CAM graduate respondents using graduate survey Questions 1-25.
4. Rank ordering of most/least useful subject areas by ranking median responses of graduates and supervisors to Questions 31-61, 63, and 68 (graduates) and Questions 10-41, and 43 (supervisors).
5. Subjective analysis and categorization of graduate and supervisor responses to survey open-ended Questions 69 and 70 (graduates) and Questions 45 and 46 (supervisors).
6. Presentation of graduate and supervisor responses to Question 67 (graduates) and 44 (supervisors) which measured opinions concerning possible incorporation of contracting related Professional Continuing Education courses into the AFIT CAM curriculum.

Conclusions

The final conclusions of this research effort are contained in five sections: Perceptions, Demographics, Curriculum Rankings, Open-Ended Questions, and Professional Continuing Education. The Perceptions, Demographics, and Curriculum Ranking sections address Research Question One, Two and Three, respectively. The Open-Ended and Professional Continuing Education sections of this chapter provided additional feedback and recommendations from field organizations

that utilize AFIT CAM graduates.

Prior to accepting the conclusions of this research, the reader should review the assumptions and limitations listed in Chapter 3. In addition, it should be noted that the research conclusions apply only to the two respondent groups of 77 graduates and 41 supervisors. Inferences to any overall population were neither attempted nor implied.

Perceptions

A summary list of AFIT CAM graduates' and their supervisors' perceptions of the overall usefulness of the AFIT CAM graduate education program is provided below:

1. Graduate respondents believed that the AFIT CAM program was useful in postgraduate assignments. This research conclusion was statistically supported by the results of the Wilcoxon Sign-Rank Test discussed in Chapter 4.
2. Supervisor respondents perceived that the AFIT CAM program was useful to subordinates in postgraduate assignments. This research conclusion was statistically supported by the results of the Wilcoxon Sign-Rank Test described in Chapter 4.
3. AFIT CAM graduate respondents and their immediate supervisors did not display a significant difference of opinion regarding the usefulness of the AFIT CAM program in postgraduate assignments. That is, graduate respondents did not find the AFIT CAM program more useful than did supervisors, nor vice versa. This research conclusion

was statistically supported by the results of the Wilcoxon Rank Sum Test described in Chapter 4.

4. Graduate respondent perceptions of AFIT CAM program usefulness have not changed over time. That is, there was no empirical evidence available to suggest that graduate respondents found an AFIT CAM education to be more or less useful over time. This research conclusion was statistically supported by the results of the Spearman Nonparametric Test for Rank Correlation described in Chapter 4. Furthermore, an informal comparison of graduate responses to survey Questions 64, 65, and 66 (see Appendix A) with the results of the Spearman Test supported the statistical conclusion.

Demographics

A summary list of the researchers' conclusions related to the demographic profile of AFIT CAM graduate respondents is provided below:

1. The researchers concluded that a sizeable plurality of the total graduate survey response consisted of responses from graduates completing the AFIT CAM program within the last three years. This fact skewed the demographic results toward the more recent AFIT CAM graduates.
2. A majority of AFIT CAM graduate respondents are career oriented Air Force captains and majors with approximately 9-18 years of service.

3. A majority of AFIT CAM respondents have assumed middle level managerial roles in the contracting/manufacturing career field, principally in Systems Contract Administration, Contract Negotiation, and Manufacturing positions. Many AFIT CAM respondents, however, hold upper level managerial roles, principally in warranted (Principal Contracting Officer) and contracting staff positions.
4. Many AFIT CAM graduate respondents are relatively inexperienced in the contracting/manufacturing career field.
5. The majority of AFIT CAM graduate respondents received their initial exposure to the contracting/manufacturing career field through the AFIT CAM program.
6. Four Major Commands provided the vast majority of officer assignment inputs to the AFIT CAM program: the Strategic Air Command, Air Force Systems Command, Military Airlift Command, and Air Force Logistics Command. The Strategic Air Command provided the most officer assignment inputs to the AFIT CAM program among all Major Commands.
7. The majority of AFIT CAM graduate respondents were assigned to the Air Force Systems Command (AFSC) immediately following graduation from the AFIT CAM program. The majority of graduate respondents initially assigned to AFSC following graduation from AFIT CAM currently remain assigned to AFSC.
8. A majority of AFIT CAM graduate respondents are assigned

in the systems level of acquisition. This supports the emphasis placed on systems acquisition in the AFIT CAM program.

9. Attendance in contracting-related Professional Continuing Education courses and completion of a basic technical contracting course are important factors in the professional development of contract managers.
10. Very little emphasis is placed on the importance of obtaining a professional contracting designation while attending the AFIT CAM program.

Curriculum Ranking

A summary list of the researchers' conclusions related to the ranking of the AFIT CAM curriculum, in terms of usefulness, is provided below:

1. AFIT CAM graduate respondents ranked all contracting specific courses among the most useful courses in the AFIT CAM curriculum in terms of usefulness in postgraduate assignments.
2. Supervisor respondents also ranked all contracting specific courses among the most useful courses in the AFIT CAM curriculum in terms of usefulness to their subordinates in postgraduate assignments.
3. In general, the AFIT CAM graduate education program has maintained subject area/topic currency and has met the needs of the Air Force contracting/manufacturing community.

4. The AFIT CAM graduate education program has been effectively managed throughout the existence of the program.
5. Subject areas identified in Tables 4.25 and 4.26 with median scores of four, "Undecided," or less did not contain material that was relevant to AFIT CAM graduate respondents in postgraduate assignments.

Open-Ended Questions

A summary list of the researchers' conclusions related to the open-ended questions is provided below:

1. In general, the AFIT CAM curriculum addressed contracting/manufacturing issues of concern to AFIT CAM graduate and supervisor respondents in the field.
2. Two topics, Software Acquisition and Small Business Contracting, were not adequately covered in the AFIT CAM curriculum.
3. The AFIT CAM curriculum placed very little emphasis upon the value of public speaking ability in contracting/manufacturing postgraduate assignments.
4. Computer instruction in the AFIT CAM curriculum did not meet the needs of AFIT CAM respondents in postgraduate contracting/manufacturing assignments.

Professional Continuing Education (PCE)

The researchers concluded that incorporation of selected contracting-related PCE courses would improve the overall usefulness of the AFIT CAM program.

Recommendations

Based on the overall research results and conclusions, the authors have identified several substantive recommendations that are presented in two categories: Recommendations for Implementation and Recommendations for Future Research.

Recommendations for Implementation

Specific recommendations based on this research that should be considered for implementation to enhance the usefulness of the AFIT CAM program are listed below:

1. The AFIT CAM Option Coordinator should evaluate the content of the following five courses in the AFIT CAM curriculum for their relevance to postgraduate contracting/manufacturing assignments:
   a. Distribution Management
   b. Introduction to Computer (Review Term)
   c. Production and Maintenance Management
   d. Quantitative Decision Making
   e. Statistics I and II
2. The AFIT CAM faculty should incorporate more opportunities for graduate AFIT CAM students to practice public speaking.
3. The AFIT School of Systems and Logistics speech course, Speech for Military Managers, should become a required course for future AFIT CAM classes. As a minimum, the AFIT CAM Option Coordinator should strongly encourage

graduate students in the AFIT CAM program to select the Speech for Military Managers course as an elective.

4. Software Acquisition and Small Business Contracting should be included as topics within the AFIT CAM curriculum in future course offerings.
5. The AFIT CAM Option Coordinator should incorporate selected contracting-related Professional Continuing Education (PCE) courses within the AFIT CAM curriculum. In particular, the following PCE courses should be considered due to their relatively short duration:
   a. Principles of Contract Pricing
   b. Contract Law
   c. Contract Negotiation Workshop
   d. Contract Administration

   These courses can be accomplished during the Review Term by restructuring the current academic work load or by offering these PCE courses, as a set of electives in Winter or Spring Quarters.
6. The AFIT CAM Option Coordinator should coordinate with professional contracting associations (i.e., National Contract Management Association) to provide future AFIT CAM students the opportunity to obtain a professional contracting designation.

Recommendations for Future Research

The researchers suggest the following specific recommendations for future empirical research in descending order

of importance:

1. For AFIT CAM program management purposes, this research effort should be replicated during the first year of a new AFIT CAM Option Coordinator's assignment to obtain current feedback from AFIT CAM graduates and their supervisors in the field.
2. Perform specific research to assess the feasibility of incorporating contracting-related Professional Continuing (PCE) courses into the graduate AFIT CAM program. Issues addressed should include:
    a. A comparative analysis of the AFIT CAM curriculum with and without incorporation of PCE courses in terms of benefits to the Air Force contracting/manufacturing community.
    b. An assessment of AFIT faculty acceptance and/or resistance to the concept of incorporating contracting-related PCE courses into the AFIT CAM curriculum.
    c. An analysis of the impact of incorporating contracting-related PCE courses on AFIT CAM program student workload and program duration.
    d. An analysis of the effect that incorporation of contracting-related PCE courses into the AFIT CAM curriculum would have upon other graduate education programs at the AFIT School of Systems and Logistics.
3. Future follow-on research projects should develop a

research methodology which will allow inferential projections to the overall population being surveyed.

4. A research project should be conducted to measure the usefulness of the AFIT Education With Industry (EWI) sponsored Contracting and Manufacturing Program as perceived by graduates and their supervisors. This project should include an evaluation of the quality and standardization of training provided by the variety of participating defense contractors.
5. Research projects similar to this effort should be conducted for other graduate education program options within the School of Systems and Logistics.
6. A parallel research project should be performed to measure the usefulness of the Naval Postgraduate School's Acquisition and Contract Management Program as perceived by graduates and their supervisors.

Final Thoughts

As a result of this research effort, the authors have shown that an AFIT CAM education is, indeed, useful in post-graduate contracting/manufacturing assignments. In a larger context, this research proved that the AFIT CAM program met the needs of the Air Force contracting/manufacturing community. The practical value of this research effort, however, is contained in the following areas:

1. This research provided real-time feedback from the field regarding AFIT CAM curriculum currency.

2. This research provided the current AFIT CAM program Option Coordinator with a tool for use in making future AFIT CAM program management decisions.
3. This research provided sponsors of the AFIT CAM program with a "report card" of the program's value from the users' point of view.
4. The findings of this research effort provided substantial justification for the continued existence of the AFIT CAM graduate program.

APPENDIX A

THE GRADUATE SURVEY INSTRUMENT

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (ATC)
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433

REPLY TO ATTN OF: LSH(LSSR 49-82/Capt Wayne/Capt Gillette/AUTOVON 785-6569)

SUBJECT: Perceptions of the AFIT Contracting Acquisition Management (CAM) Program Survey

TO:

1. The AFIT CAM Graduate Program has graduated thirteen classes since its inception. The research team wants to ascertain the extent to which the AFIT CAM program is meeting the on-the-job needs of the Air Force. The attached questionnaire is intended to determine how past graduates and their supervisors feel about the usefulness of the AFIT graduate CAM program in postgraduate assignments. The survey has been reviewed and approved by Air University (AU) and has been designated by AU Survey Control Number 82-22.

2. Your participation is entirely voluntary. As a past graduate of the CAM program, your feelings are extremely important. A valid cross-section of attitudes is possible only with the generous cooperation of participants like you.

3. Do not discuss your responses with any other survey participant. Please be candid in your responses!

4. Your participation in this survey will be sincerely appreciated. Be assured that there will be no attempt to pair your responses with those of any other survey participant. The researchers are interested only in the collective responses of graduates and supervisors, not individual attitudes. Your responses to the questions will be confidential and known only to the researchers.

5. Please return the completed survey in the enclosed pre-addressed envelope no later than 7 Jun 1982.

Jerome J. Peppers, Jr.
Acting Dean
School of Systems and Logistics

2 Atch
1. Survey
2. Answer Sheet

AU SCN 82-22 (Expires 1 May 1983)

AIR FORCE—A GREAT WAY OF LIFE

PRIVACY ACT STATEMENT

In accordance with paragraph 8, AFR 12-35, Air Force Privacy Act Program, the following information is provided:

a. Authority.

(1) 5 U.S.C. 301, Departmental Regulations; and/or

(2) 10 U.S.C., 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and or

(3) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal purpose. This information will be used in research aimed at providing inputs to the solution of problems in Air Force personnel recruiting and retention.

c. Routine uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

GENERAL INSTRUCTIONS

1. This questionnaire has three parts to complete. Each part has specific instructions. Your responses to Part I, Part II, and Part III should be answered directly on the questionnaire. The questionnaire should be mailed back in the pre-addressed return envelope.

2. AFIT/LSG and AFIT/SLG are the same. Both denote the AFIT School of Systems and Logistics.

3. The term AFIT/LSG Graduate Contracting and Acquisition Management Program (CAM) and AFIT/SLG Graduate Logistics Management with a major in Procurement are the same.

4. Answer the questions only as they relate to the AFIT School of Systems and Logistics Graduate Contracting and Acquisition Management Program (CAM), not other graduate education programs you might have attended.

PART I

DEMOGRAPHICS

Please circle your answers to the following questions.

1. My sex is:
   a. Male
   b. Female

2. My present age group is:
   a. 20-25 yrs.
   b. 26-30 yrs.
   c. 31-35 yrs.
   d. 36-40 yrs.
   e. 41-45 yrs.
   f. 46-50 yrs.
   g. Over 50 yrs.

3. My present rank is:
   a. O-1
   b. O-2
   c. O-3
   d. O-4
   e. O-5
   f. O-6
   g. Civilian (Specify Grade & Step) _____

4. Prior to entering the AFIT CAM program, I was assigned to:

a. SAC	h. USAFA	o. AFCS
b. TAC	i. USAFE	p. AFLC
c. MAC	j. USAFSO	q. AFSC
d. ATC	k. USAFSS	r. USAFRED
e. AU	l. AAC	s. Other (Specify) _____
f. HQ USAF	m. ADC	
g. PACAF	n. AFAFC	

5. Upon completion of the AFIT CAM program, I was assigned to:

a. SAC	h. USAFA	o. AFCS
b. TAC	i. USAFE	p. AFLC
c. MAC	j. USAFSO	q. AFSC
d. ATC	k. USAFSS	r. USAFRED
e. AU	l. AAC	s. Other (Specify) _____
f. HQ USAF	m. ADC	
g. PACAF	n. AFAFC	

6. What was your grade when you completed your Graduate Contracting and Acquisition Management (CAM) Program?
   a. O-1
   b. O-2
   c. O-3
   d. O-4
   e. O-5
   f. O-6
   g. Civilian (Specify Grade & Step) _____

7. When did you graduate from the AFIT/CAM program?

a. 1981	e. 1978A	i. 1976A	m. 1974B		
b. 1980	f. 1978B	j. 1976B	n. Have not completed program		
c. 1979A	g. 1977A	k. 1975A			
d. 1979B	h. 1977B	l. 1975B			

8. The level of my current assignment is:
   a. Squadron or below
   b. Group
   c. Wing
   d. Air Division
   e. Numbered Air Force
   f. Major Command
   g. HQ Air Force
   h. Special Assignments

9. I am presently assigned to:

a. SAC	h. USAFA	o. AFCS
b. TAC	i. USAFE	p. AFLC
c. MAC	j. USAFSO	q. AFSC
d. ATC	k. USAFSS	r. USAFRED
e. AU	l. AAC	s. Other (Specify) _____
f. HQ USAF	m. ADC	
g. PACAF	n. AFAFC	

10. The highest level of education I attained is:
    a. Bachelor's degree
    b. Master's degree
    c. Master's degree plus additional graduate work
    d. More than one Master's degree
    e. Doctorate

11. My current duty AFSC is:

a. 28XX	h. 62XX	o. 27XX
b. 30XX	i. 63XX	p. 29XX
c. 31XX	j. 64XX	q. 55XX
d. 43XX	k. 65XX	r. Other
e. 46XX	l. 66XX	s. Civilian
f. 51XX	m. 67XX	
g. 60XX	n. 004X	

12. What is your current 65XX AFSC?
    a. 6511
    b. 6516
    c. 6521
    d. 6524
    e. 6531
    f. 6534
    g. Not currently in a 65XX job
    h. Civilian

13. I personally supervise:
    a. 0
    b. 1 - 5 people
    c. 6 - 10 people
    d. 11-15 people
    e. 16-20 people
    f. over 20 people

14. My reporting official is well acquainted with both the requirements of my job and my performance.
    a. yes
    b. no

15. The majority of my duty assignments since graduation have been in a contracting or procurement related field.
    a. True
    b. False

16. I have held my present assignment for:
    a. 1 yr or less
    b. over 1 yr. but less than 2 yrs.
    c. over 2 yrs. but less than 3 yrs.
    d. 3 yrs or over

17. How many 65XX or contracting related assignments have you had since graduating from the AFIT CAM Program?
    a. 1
    b. 2
    c. 3
    d. 4 or more
    e. none

18. How many years of contracting or manufacturing experience do you currently have?
    a. 3 yrs or less
    b. over 3 yrs. but less than 5 yrs.
    c. over 5 yrs. but less than 8 yrs.
    d. over 8 yrs. but less than 11 yrs.
    e. over 11 yrs.

19. I am currently a:
    a. Price Analyst
    b. Cost Analyst
    c. Contract Negotiator
    d. Contract Specialist
    e. Principal Contracting Officer (warranted)
    f. Administrative Contracting Officer (warranted)
    g. Manufacturing (or Production) Officer
    h. Other (Specify) _____

20. What type of contracting have you been involved in since your graduation from the graduate AFIT CAM program?
    a. Base
    b. Central
    c. Systems
    d. All of the above
    e. a & b
    f. a & c
    g. b & c
    h. Other (specify) _____

21. Were you in the contracting field prior to the start of your graduate program?
    a. yes (specify 65XX AFSC or 1100/1200 series)_____
    b. no

22. How many AFIT Professional Continuing Education (contracting related) courses have you attended since your graduation from the graduate AFIT CAM Program?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4 or more

23. Have you attended a basic technical contracting course either before or after graduation from the graduate AFIT CAM Program (i.e., Lowry AFB or Ft. Belvoir)?
    a. yes, before graduation
    b. yes, after graduation
    c. no

24. Have you published at least one article in a professional journal since graduation from the graduate AFIT CAM program?
    a. yes (specify publication)_____
    b. no

25. Have you obtained a professional contracting designation since graduation from the graduate AFIT CAM program (such as NCMA's Certified Professional Contracts Manager)?
    a. yes
    b. no

PART II

PERCEPTIONS

The questions in this section are concerned with the usefulness of the graduate AFIT CAM program and the requirements of your post-graduate assignments. If you are no longer in a contracting/ manufacturing type job (65XX AFSC), please answer these questions based on the last contracting job you held. Please use the following response scale for each question. PLACE YOUR ANSWER ON THE BLANK SPACE PROVIDED NEXT TO EACH QUESTION.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___26. I feel that my graduate AFIT CAM education is useful to the Air Force.

___27. I would encourage other qualified officers to attend the graduate AFIT CAM program.

___28. I feel that my graduate AFIT CAM education has enhanced my Air Force career.

___29. I feel that my graduate AFIT CAM education is useful to my on-the-job performance.

___30. I feel that I am better equipped to solve on-the-job problems because of my graduate AFIT CAM education.

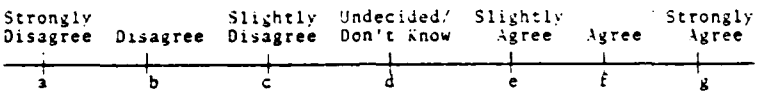
___31. My job requires the ability to understand and/or apply mathematical techniques beyond basic arithmetic operations.

___32. My job requires the ability to understand and analyze accounting records and reports (such as fund coding system, budgets, cost center reports, allotment ledgers, financial statements, etc.).

___33. My job requires the ability to formally or informally analyze existing organizational structure (such as work flow patterns, interpersonal communications, etc.).

___34. My job requires the understanding and/or application of statistical analysis concepts (such as in requirements forecasting, analysis of trends, predicting the probability of an occurrence, etc.).

Use the following response scale for each question. Place your answer in the blank space provided next to each question.



___35. My job requires an understanding of the financial management methods and systems used by the DoD (such as the Resource Management System, Programming, Planning and Budgeting System, industrial funds, stock funds, etc.).

___36. My job requires the ability to manage and/or integrate the various elements of distribution systems such as base supply systems, transportation methods, order processing, inventory control, etc.

___37. My job requires the ability to manage or control maintenance and/or production processes (such as scheduling, component assembly, repair, etc.).

___38. My job requires a knowledge of DoD involvement in international military systems programs such as the Grant Aid Program, Foreign Military Sales Program, international supply support arrangements, foreign military training, etc.

___39. My job requires the ability to determine and/or evaluate the impact of reliability and maintainability on the acquisition and support of weapons systems and their components.

___40. My job requires an understanding of quality control concepts such as specification compliance, standardization and evaluation programs, inspection routines, etc.

___41. My job requires the ability to develop models that will allow evaluating alternate courses of action prior to implementation.

___42. My job requires the ability to understand the capabilities and limitations of the computer as an aid in the solution of management problems.

___43. My job requires the ability to program a computer.

___44. My job requires the ability to understand and/or analyze organizational climate and the behavior of individuals within that organization.

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___45. My job requires the ability to verbally inform, convince, and/or persuade individuals relative to ideas, decisions, and concepts.

___46. My job requires the ability to communicate in writing in such a manner as to inform, convince, and/or persuade individuals relative to ideas, decisions, and concepts (such as in the preparation of reports, correspondence, etc.).

___47. My job requires an understanding of economic concepts relating to individual organizations such as marginal costs, time value of money, market structures, etc. (microeconomic concepts).

___48. My job requires an understanding of societal economic concepts such as inflation, gross national product, balance of payments, etc. (macroeconomic concepts).

___49. My job requires the ability to use and/or understand quantitative decision-making techniques such as best order quantity, transportation routes with the lowest cost, most efficient use of available personnel, etc.

___50. My job requires the ability to understand and analyze such things as the major systems acquisition process, market environments, logistics considerations, financial arrangements, and manufacturing.

___51. My job requires the ability to understand or apply pricing techniques (such as learning curves, cost estimating relationships, cost/price analysis, etc.).

___52. My job requires the ability to understand or apply risk/uncertainty analysis in areas such as Acquisition Planning, Business Strategy, Contract Strategy, and negotiations.

___53. My job requires a working knowledge of those federal laws applicable in the letting and administration of contracts (such as laws/regulations concerning competitive bidding, use of accepted specifications, etc.).

___54. In my job, it is necessary to take into consideration federal laws, regulations or policies concerning social and environmental related topics such as OSHA, EPA, small business subcontracting, etc.

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___55. My job requires a knowledge of contract management functions such as Administrative Contracting Officer responsibilities, manufacturing operations, subcontract management, quality assurance, contract payment, overhead cost monitorship, etc.

___56. I am familiar with the DoD organizations for contract management (i.e., AFCMD, AFCMC, DCAS).

___57. My job requires a working knowledge of acquisition management subjects such as major systems acquisition policies, manufacturing management, the source selection process, co-production management, contract modifications, configuration management, fraud, waste, and abuse in government contracting, etc.

___58. My job requires the ability to understand and/or analyze cost growth problems, project management, the negotiation process, and acquisition strategies.

___59. My job requires a working knowledge of the contract administration process.

___60. My job requires the ability to understand and/or analyze contractor proposals in such areas as cost estimation, program scheduling, contractor pricing techniques, contractor accounting techniques, etc.

___61. My job requires a working knowledge of manufacturing (or production) related issues (such as manufacturing processes, computer aided design/computer aid manufacturing (CAD/CAM), producibility, production readiness reviews, Manufacturing Technology/Technology Modernization, etc.).

___62. The skills that I acquired from my AFIT CAM education have proven useful in meeting the requirements of my job.

___63. My ability to conduct research (i.e., a thesis) is useful in performing my job.

___64. My AFIT CAM education has been of more value in my current assignment than it will be in future assignments.

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___05. My AFIT CAM education will be of more value in future assignments than it has been in my current assignment.

___06. I feel that the value of my AFIT CAM education has increased over time.

___07. I feel that the incorporation of contracting related Professional Continuing Education courses into the graduate AFIT CAM program would improve the overall usefulness of this program.

___08. My job requires the ability to understand research methodologies and/or analyze acquisition research.

PART III

OPEN-ENDED QUESTIONS

Please answer the following questions in the space provided after each question.

69. Based on your field experience, what subject areas do you feel are important or necessitate emphasis in the graduate AFIT CAM curriculum?

70. Based on your field experience, what subject areas would you remove or de-emphasize from the graduate AFIT CAM curriculum?

THANK YOU FOR YOUR COOPERATION IN COMPLETING THIS QUESTIONNAIRE.

PLEASE ENCLOSE THE QUESTIONNAIRE IN THE RETURN ENVELOPE AND PLACE THE ENVELOPE IN OUTGOING OFFICIAL DISTRIBUTION.

APPENDIX B

THE SUPERVISOR SURVEY INSTRUMENT

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (ATC)
WRIGHT PATTERSON AIR FORCE BASE OH 45433

REPLY TO ATTN OF: LSH/LSSR 49-82/Capt Wayne/Capt Gillette (AUTOVON 785-3569)

SUBJECT: Perceptions of the AFIT Contracting Acquisition Management (CAM) Program Survey

TO

1. The AFIT CAM Graduate Program has graduated thirteen classes since its inception. The research team wants to ascertain the extent to which the AFIT CAM program is meeting the on-the-job needs of the Air Force. The attached questionnaire is intended to determine how past graduates and their supervisors feel about the usefulness of the AFIT graduate CAM program in postgraduate assignments. The survey has been reviewed and approved by Air University (AU) and has been designated by AU Survey Control Number 82-21.

2. Your participation is entirely voluntary. As a current supervisor of a CAM graduate, your feelings are extremely important. A valid cross-section of attitudes is possible only with the generous cooperation of participants like you.

3. Do not discuss your responses with any other survey participants. Please be candid in your responses!

4. Your participation in this survey will be sincerely appreciated. Be assured that there will be no attempt to pair your responses with those of any other survey participant. The researchers are interested only in the collective responses of graduates and supervisors not individual attitudes. Your responses to the questions will be confidential and known only to the researchers.

5. Please return the completed survey in the enclosed pre-addressed envelope no later than 7 Jun 1982.

Jerome G. Peppers, Jr.
Acting Dean
School of Systems and Logistics

2 Atch
1. Survey
2. Answer Sheet

AU SCN 82-21 (Expires 1 May 1983)

AIR FORCE - A GREAT WAY OF LIFE

PRIVACY ACT STATEMENT

In accordance with paragraph 8, AFR 12-35, Air Force Privacy Act Program, the following information is provided:

a. Authority.

(1) 5 U.S.C. 301, Departmental Regulations; and/or

(2) 10 U.S.C., 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and or

(3) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal purpose. This information will be used in research aimed at providing inputs to the solution of problems in Air Force personnel recruiting and retention.

c. Routine uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

GENERAL INSTRUCTIONS

1. This questionnaire has three parts to complete. Each part has specific instructions. Your responses to Part I, Part II, and Part III should be answered directly on the questionnaire. The questionnaire should be mailed back in the pre-addressed return envelope.

2. AFIT/LSG and AFIT/SLG are the same. Both denote the AFIT School of Systems and Logistics.

3. The term AFIT/LSG Graduate Contracting and Acquisition Management Program (CAM) and AFIT/SLG Graduate Logistics Management with a major in Procurement are the same.

4. Answer the questions only as they relate to the AFIT School of Systems and Logistics Graduate Contracting and Acquisition Management (CAM) Program, not other graduate education programs your subordinate might have attended.

PART I

DEMOGRAPHICS

Please circle your answers to the following questions.

1. I am submitting this survey for more than one AFIT CAM subordinate under my supervision.
   a. yes (specify # _____)
   b. no

2. I am well acquainted with the requirements of my subordinate's job as well as his/her performance.
   a. yes
   b. no

3. Are you a graduate of the AFIT School of Systems and Logistics Contracting and Acquisition Management (CAM) Program? (formerly known as Logistics Management with Procurement major)
   a. yes
   b. no

4. I personally supervise the following number of AFIT CAM graduates.
   a. 1
   b. 2
   c. 3
   d. 4
   e. other (specify) _____

PART II

PERCEPTIONS

The questions in this section are concerned with the usefulness of the AFIT graduate Contracting and Acquisition Management (CAM) program and the requirements of your subordinate's job. Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___5. I feel that my subordinate's AFIT CAM education is useful to the Air Force.

___6. I would encourage other people who work for me to attend the AFIT CAM graduate program.

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___7. I feel that my subordinate's AFIT CAM education has enhanced his or her Air Force career.

___8. I feel that my subordinate's AFIT CAM education is useful to his or her on-the-job performance.

___9. I feel that my subordinate is better equipped to solve on-the-job problems because of his or her AFIT CAM education.

___10. My subordinate's job requires the ability to understand and analyze accounting records and reports (such as fund coding system, budgets, cost center reports, allotment ledgers, financial statements, etc.).

___11. My subordinate's job requires the ability to understand and/or apply mathematical techniques beyond basic arithmetic operations.

___12. My subordinate's job requires the ability to use and/or understand quantitative decision-making techniques (such as best order quantity, transportation routes with the lowest cost, most efficient use of available personnel, etc.).

___13. My subordinate's job requires the ability to formally or informally analyze existing organizational structure (such as work flow patterns, interpersonal communications, etc.).

___14. My subordinate's job requires the understanding and/or application of statistical analysis concepts (such as in requirements forecasting, analysis of trends, predicting and probability of an occurrence, etc.)

___15. My subordinate's job requires an understanding of the financial management methods and systems used by the DoD (such as the Resource Management System, Programming, Planning and Budgeting System, industrial funds, stock funds, etc.).

___16. My subordinate's job requires the ability to manage and/or integrate the various elements of distribution systems (such as base supply systems, transportation methods, order processing, inventory control, etc.).

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided Don't know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___17. My subordinate's job requires the ability to manage or control maintenance and/or production processes (such as scheduling, component assembly, repair, etc.).

___18. My subordinate's job requires a knowledge of DoD involvement in international military systems programs (such as the Grant Aid Program, Foreign Military Sales Program, international supply support arrangements, foreign military training, etc.).

___19. My subordinate's job requires the ability to determine and/or evaluate the impact of reliability and maintainability on the acquisition and support of weapons systems and their components.

___20. My subordinate's job requires an understanding of quality control concepts (such as specification compliance, standardization and evaluation programs, inspection routines, etc.).

___21. My subordinate's job requires the ability to develop models that will allow evaluating alternate courses of action prior to implementation.

___22. My subordinate's job requires the ability to understand the capabilities and limitations of the computer as an aid in the solution of management problems.

___23. My subordinate's job requires the ability to program a computer.

___24. My subordinate's job requires the ability to understand and/or analyze organizational climate and the behavior of individuals within that organization.

___25. My subordinate's job requires the ability to <u>verbally</u> inform, convince, and/or persuade individuals relative to ideas, decisions, and concepts.

___26. My subordinate's job requires the ability to communicate in <u>writing</u> in such a manner as to inform, convince and/or persuade individuals relative to ideas, decisions, and concepts (such as in the preparation of reports, correspondence, etc.).

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

____27. My subordinate's job requires an understanding of economic concepts relating to individual organizations such as marginal costs, time value of money, etc. (microeconomic concepts).

____28. My subordinate's job requires an understanding of societal economic concepts such as inflation, gross national product, balance of payments, etc. (macroeconomic concepts).

____29. My subordinate's ability to conduct research (i.e., a thesis) is useful in his/her job performance.

____30. My subordinate's job requires the ability to understand and analyze such things as the major systems acquisition process, market environments, logistics considerations, financial arrangements, and manufacturing.

____31. My subordinate's job requires the ability to understand or apply pricing techniques (such as learning curves, cost estimating relationships, cost/price analysis, etc.).

____32. My subordinate's job requires the ability to understand or apply risk/uncertainty analysis in areas such as Acquisition Planning, Business Strategy, Contract Strategy and negotiations.

____33. My subordinate's job requires a working knowledge of those federal laws applicable in the letting and administration of contracts (such as laws/regulations concerning competitive bidding, use of accepted specifications, etc.).

____34. In my subordinate's job, it is necessary to take into consideration federal laws, regulations, or policies concerning social and environmental related topics such as OSHA, EPA, small business contracting, etc.

____35. My subordinate's job requires a knowledge of contract management functions such as Administrative Contracting Officer responsibilities, manufacturing operations, subcontract management, quality assurance, contract payment, overhead cost monitorship, etc.

____36. My subordinate is familiar with the DOD organizations for contract management (i.e., AFCMD, AFPRO, DCAS).

Use the following response scale for each question. Place your answer in the blank space provided next to each question.

Strongly Disagree	Disagree	Slightly Disagree	Undecided/ Don't Know	Slightly Agree	Agree	Strongly Agree
a	b	c	d	e	f	g

___37. My subordinate's job requires a working knowledge of acquisition management subjects such as major systems acquisition policies, manufacturing management, the source selection process, co-production management, contract modifications, configuration management, fraud, waste, and abuse in government contracting, etc.

___38. My subordinate's job requires the ability to understand and/or analyze cost growth problems, project management, the negotiation process, and acquisition strategies.

___39. My subordinate's job requires a working knowledge of the contract administration process.

___40. My subordinate's job requires the ability to understand and/or analyze contractor proposals in such areas as cost estimation, program scheduling, contractor pricing techniques, contractor accounting techniques, etc.

___41. My subordinate's job requires a working knowledge of manufacturing (or production) related issues (such as manufacturing processes computer-aided design/computer aid manufacturing (CAD/ CAM), producibility, production readiness reviews, etc.).

___42. The skills that my subordinate acquired from his or her AFIT CAM education have proven useful in meeting the requirements of the job.

___43. My subordinate s job requires the ability to understand research methodologies and/or analyze acquisition research.

___44. I feel that the incorporation of contracting related Professional Continuing Education courses into the graduate AFIT CAM program would improve the overall usefulness of this program.

PART III

OPEN-ENDED QUESTIONS

Please answer the following questions in the space provided after each question.

45. Based on your field experience, what subject areas do you feel are important or necessitate emphasis in the graduate AFIT CAM curriculum?

46. Please list those job related areas in which you feel that your subordinate is strongest and weakest.

Strongest	Weakest

THANK YOU FOR YOUR COOPERATION IN COMPLETING THIS QUESTIONNAIRE.

PLEASE ENCLOSE THE QUESTIONNAIRE IN THE RETURN ENVELOPE AND PLACE THE ENVELOPE IN OUTGOING OFFICIAL DISTRIBUTION.

APPENDIX C

STATISTICAL OUTPUT

TABLE C-1

* C R O S S T A B U L A T I O N O F *
Q BY RESP
* *

Q		RESP 1.	RESP 2.	ROW TOTAL
	COUNT / ROW PCT / COL PCT / TOT PCT			
26.		1	76	77
		1.3	98.7	16.7
		2.8	17.8	
		0.2	16.5	
27.		6	71	77
		7.8	92.2	16.7
		16.7	16.7	
		1.3	15.4	
28.		11	66	77
		14.3	85.7	16.7
		30.6	15.5	
		2.4	14.3	
29.		5	72	77
		6.5	93.5	16.7
		13.9	16.9	
		1.1	15.6	
30.		8	69	77
		10.4	89.6	16.7
		22.2	16.2	
		1.7	14.9	
62.		5	72	77
		6.5	93.5	16.7
		13.9	16.9	
		1.1	15.6	
COLUMN TOTAL		36	426	462
		7.8	92.2	100.0

CHI SQUARE = 10.12207 WITH 5 DEGREES OF FREEDOM SIGNIFICANCE = 0.0718

TABLE C-2

* CROSSTABULATION OF
Q BY RESP
* *

Q	RESP 1.	RESP 2.	ROW TOTAL
26.	0	77	77
	0.0	100.0	16.7
	0.0	17.3	
	0.0	16.7	
27.	2	75	77
	2.6	97.4	16.7
	11.1	16.9	
	0.4	16.2	
28.	2	75	77
	2.6	97.4	16.7
	11.1	16.9	
	0.4	16.2	
29.	4	73	77
	5.2	94.8	16.7
	22.2	16.4	
	0.9	15.8	
30.	7	70	77
	9.1	90.9	16.7
	38.9	15.8	
	1.5	15.2	
62.	3	74	77
	3.9	96.1	16.7
	16.7	16.7	
	0.6	16.0	
COLUMN TOTAL	18	444	462
	3.9	96.1	100.0

CHI SQUARE = 9.71171 WITH 5 DEGREES OF FREEDOM SIGNIFICANCE = 0.0838

TABLE C-3

* CROSSTABULATION OF
Q BY RESP
* *

Q	COUNT / ROW PCT / COL PCT / TOT PCT	RESP 1.0	RESP 2.0	ROW TOTAL
5.		39	2	41
		95.1	4.9	16.7
		17.3	10.0	
		15.9	0.8	
6.		36	5	41
		87.8	12.2	16.7
		15.9	25.0	
		14.6	2.0	
7.		38	3	41
		92.7	7.3	16.7
		16.8	15.0	
		15.4	1.2	
8.		38	3	41
		92.7	7.3	16.7
		16.8	15.0	
		15.4	1.2	
9.		37	4	41
		90.2	9.8	16.7
		16.4	20.0	
		15.0	1.6	
42.		38	3	41
		92.7	7.3	16.7
		16.8	15.0	
		15.4	1.2	
COLUMN TOTAL		226	20	246
		91.9	8.1	100.0

CHI SQUARE = 1.74159 WITH 5 DEGREES OF FREEDOM SIGNIFICANCE = 0.8836

TABLE C-4

* CROSSTABULATION OF Q BY RESP *

Q	RESP 1.	RESP 2.	ROW TOTAL
5.	0	41	41
	0.0	100.0	16.7
	0.0	16.9	
	0.0	16.7	
6.	1	40	41
	2.4	97.6	16.7
	25.0	16.5	
	0.4	16.3	
7.	0	41	41
	0.0	100.0	16.7
	0.0	16.9	
	0.0	16.7	
8.	1	40	41
	2.4	97.6	16.7
	25.0	16.5	
	0.4	16.3	
9.	1	40	41
	2.4	97.6	16.7
	25.0	16.5	
	0.4	16.3	
42.	1	40	41
	2.4	97.6	16.7
	25.0	16.5	
	0.4	16.3	
COLUMN TOTAL	4	242	246
	1.6	98.4	100.0

CHI SQUARE = 2.03306 WITH 5 DEGREES OF FREEDOM SIGNIFICANCE = 0.8446

TABLE C-5

- - - - - WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST

B
WITH A

CASES	TIES	0 -RANKS MEAN	76 +RANKS MEAN	Z	2-TAILED P
77	1	0.00	38.50	-7.574	0.000

Results: Research Hypothesis One

TABLE C-6

- - - - - WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST

B
WITH A

CASES	TIES	1 -RANKS MEAN	39 +RANKS MEAN	Z	2-TAILED P
41	1	1.00	21.00	-5.497	0.000

Results: Research Hypothesis Two

TABLE C-7

- - - - - MANN-WHITNEY U - WILCOXON RANK SUM W TEST

T
BY R

R = 1.		R = 2.	
MEAN RANK	NUMBER	MEAN RANK	NUMBER
56.34	77	61.68	41

		CORRECTED FOR TIES	
U	W	Z	2-TAILED P
1489.0	2529.0	-0.5078	0.6116

Results: Research Hypothesis Three

TABLE C-8

S P E A R M A N C O R R E L A T I O N C O E F F I C I E N T S

VARIABLE PAIR	
SCORE	0.0410
WITH	N(77)
YEAR	SIG .362

Results: Research Hypothesis Four

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BIOGRAPHICAL SKETCHES

Captain Robert B. Gillette graduated from Florida State versity with a Bachelor of Science in Business Management. a Distinguished ROTC Graduate, he was co[illegible]ssioned in June 7 and assigned to Wright-Patterson AFB, Ohio, in the Aero- tical Systems Division (ASD) as a Research and Development curement Officer. During the ensuing three years, he was igned to the Aeronautical Equipment System Program Office O) and the F-15 SPO as a systems contract negotiator. le attending AFIT, Captain Gillette was a member of Sigma a Epsilon and the National Contract Management Association. lowing graduation, he was assigned to the Air Force Plant resentative Office, Martin Marietta Corporation in Denver, orado.

Captain John H. Wayne Jr. graduated from Rutgers versity with a Bachelor of Arts in Political Science. missioned through ROTC in 1973, he was assigned to Moody , Georgia, for Undergraduate Pilot Training. In July 1975 completed B-52H qualification training at Castle AFB, ifornia, and was assigned to the 23rd Bombardment Squadron avy) at Minot AFB, North Dakota. While stationed at Minot for six years, Captain Wayne performed B-52H copilot, ot, instructor pilot, and flight examiner duties. While nding AFIT, he was a member of Sigma Iota Epsilon. Follow- graduation, he was assigned to ASD, the B-1B SPO, at ht-Patterson AFB, Ohio.

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